THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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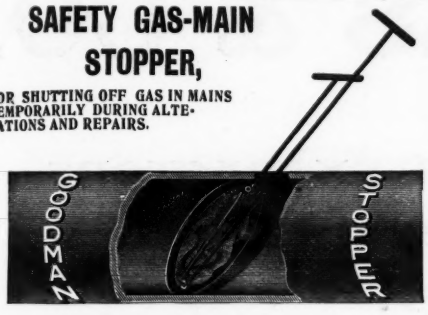

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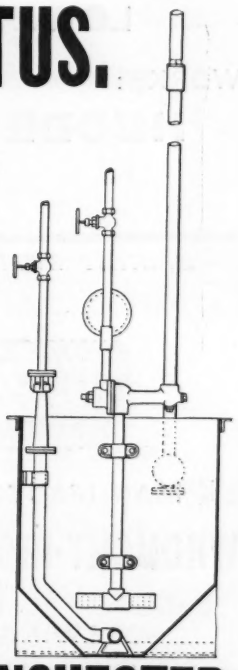

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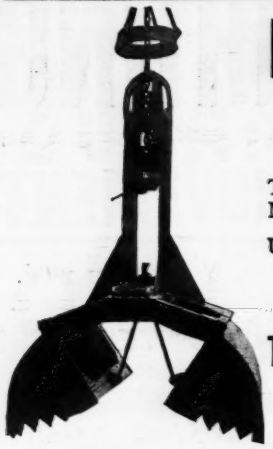

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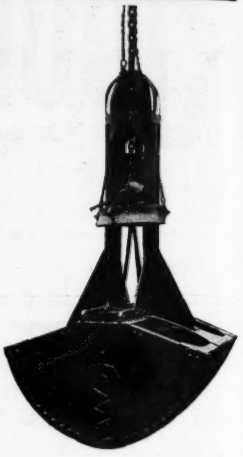

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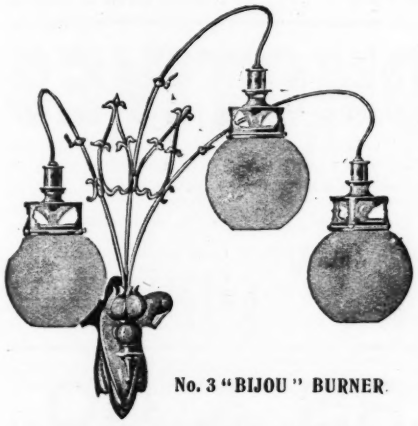

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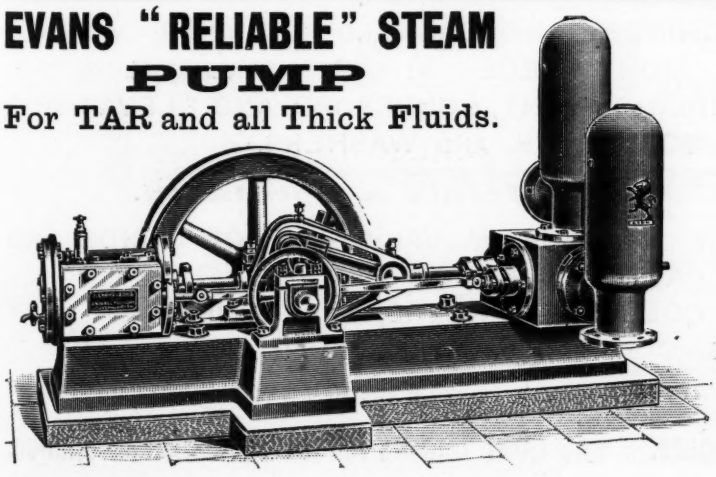

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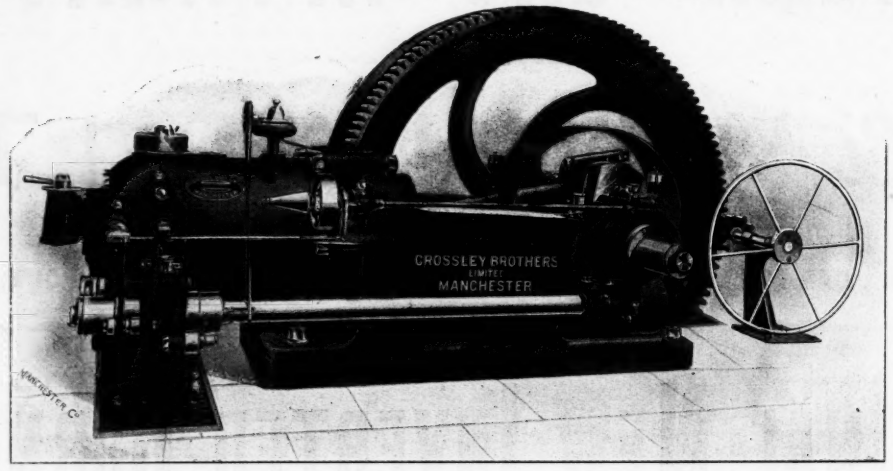

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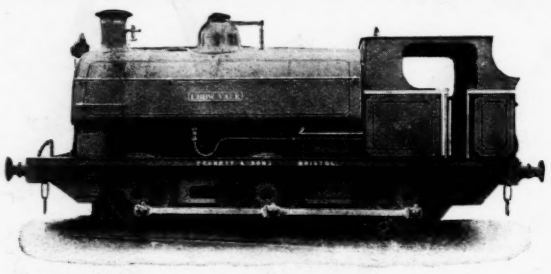

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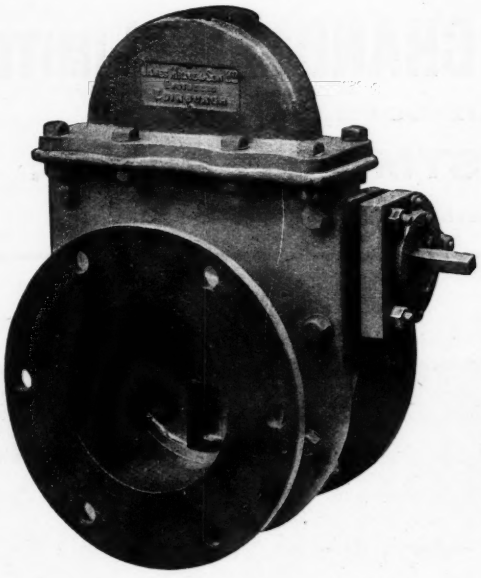

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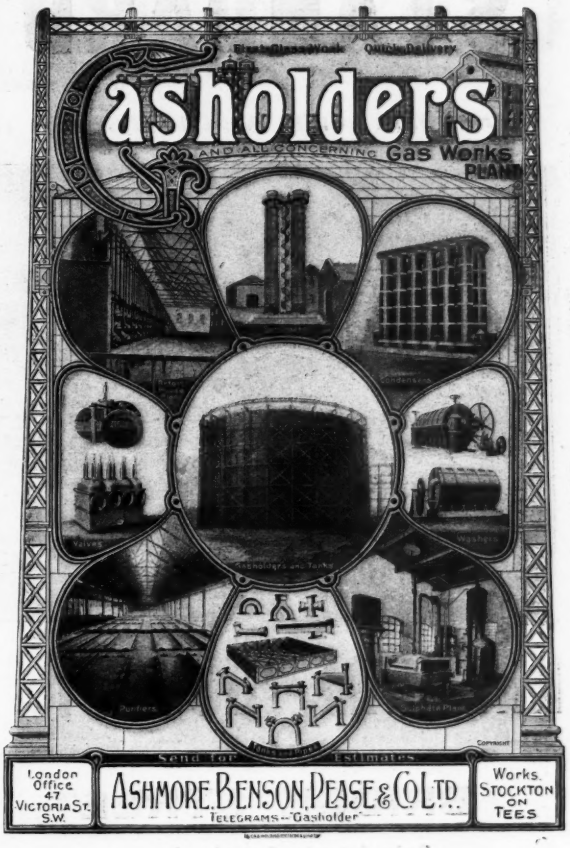

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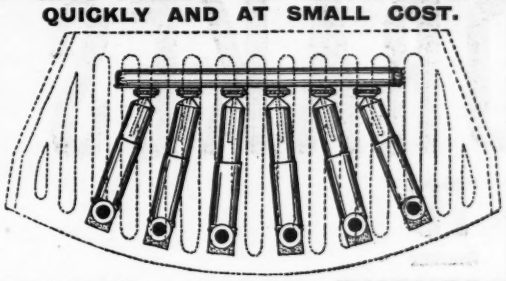

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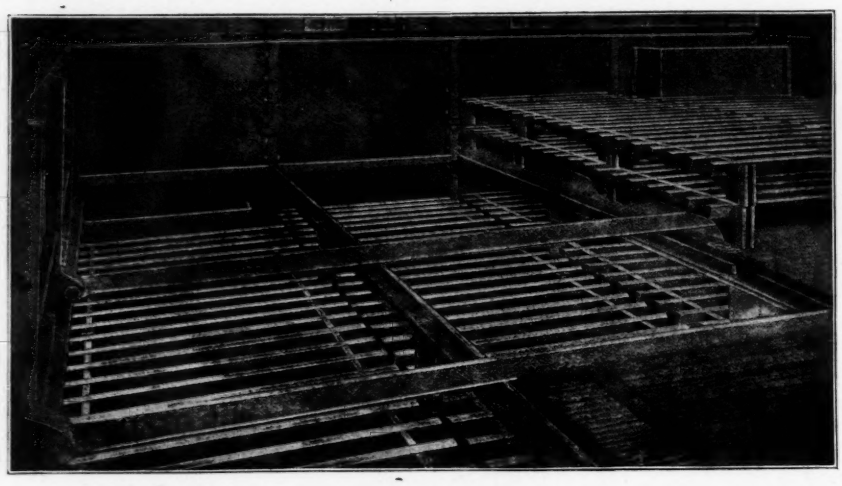

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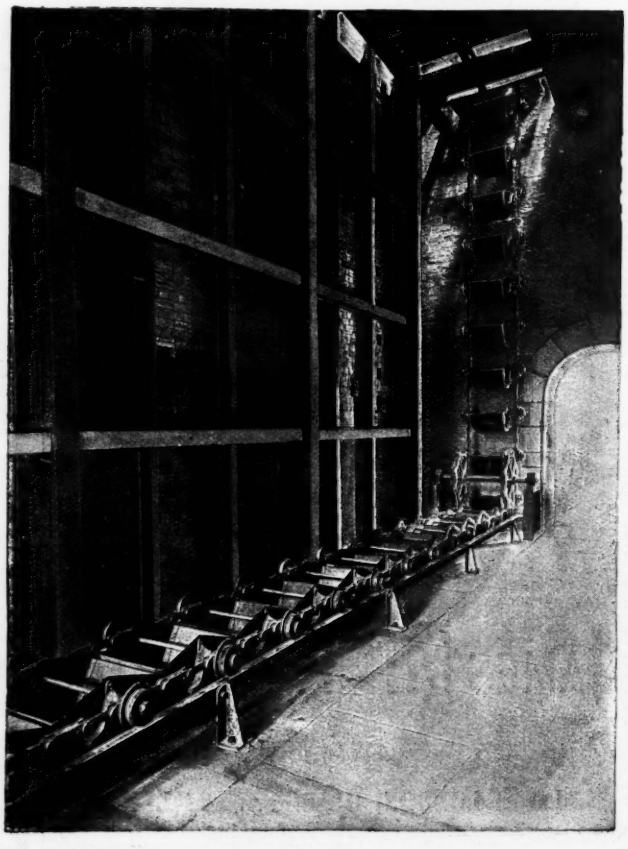

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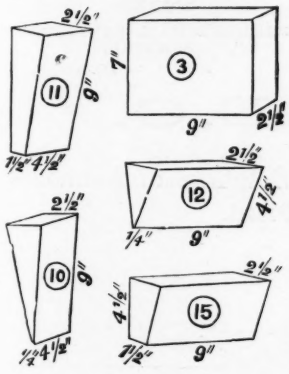

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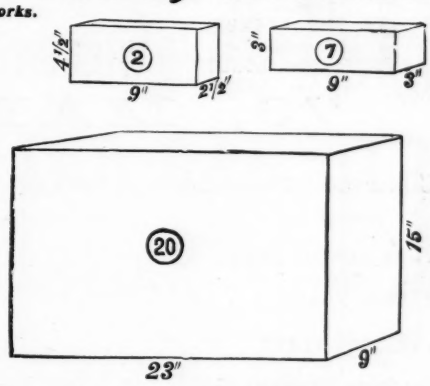

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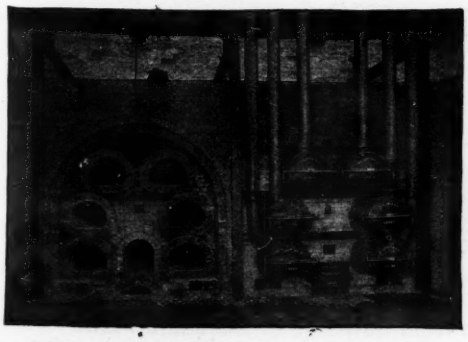

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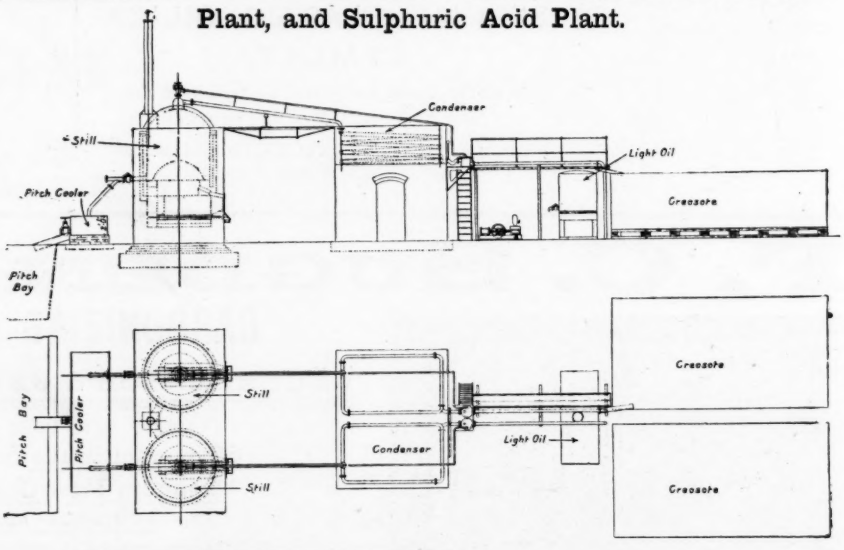

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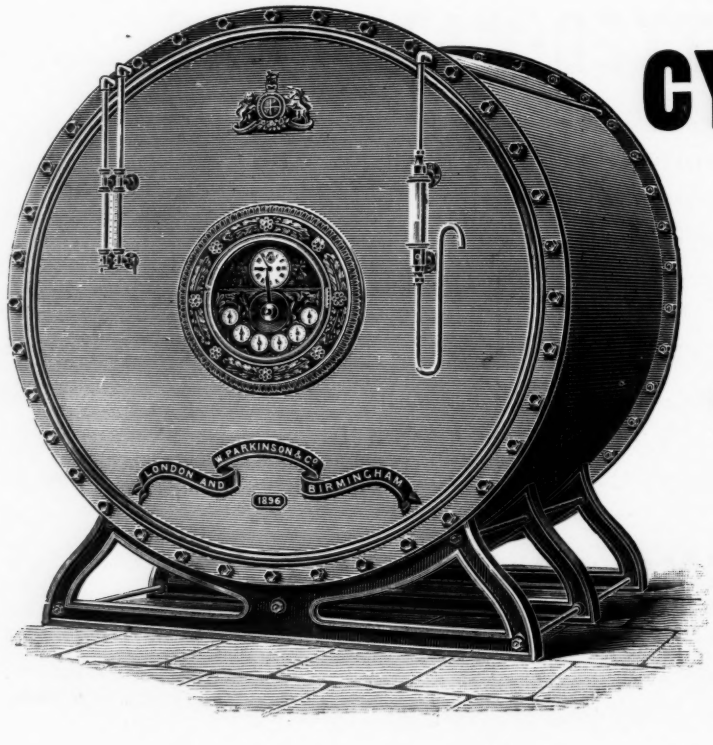

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Fresh Light on Vertical Retort Working.

WITH the contributions to the vertical retort question which we publish this week, we have arrived at what will be agreed is a most important and indeed fascinating stage in the investigation which is being urged forward, in different quarters and from different standpoints, into the problems underlying the carbonization of coal in vertical retorts. The contributions will assure all who read deeply that there is now before us sufficient evidence to prove, first, that there is something more in the vertical retort than was originally suspected, and, secondly, that the time has come when the engineer and the physicist must join hands in unravelling the knotty problems that surround the experiences so far divulged. For there are (may we not call them?) mysteries to be still explained; there are yet mechanical difficulties to be overcome, and proposals to be proved. The vertical retort setting in itself as a structure divested of mechanical or special arrangements having some particular or distinguishing purpose, is a comparatively simple thing; but on the questions as to what happens in a vertical retort, and what happens as the result of the application of variations in methods of working, the investigators are somewhat remote from agreement. The most valuable of all light on the subject has been thrown in the series of articles that Mr. William Young has, through our columns, so generously given to the gas profession—laying bare before them a long and unique experience in, and matured opinions upon, the utilization of vertical retorts with purposes and effects dissimilar it may be from, but still kindred to, those which the gas manufacturer has in view. We are only sorry that the great knowledge and experience that Mr. Young possesses cannot now be utilized in some direct personal investigation by him into the working of the actual settings themselves which are now before the gas industry under the names of the Woodall-Duckham, the Settle-Padfield, and the Dessau; for we are convinced that much that is now unexplained would then be explained, and that there would result considerable light where there is now darkness. But the next best thing will follow as early as possible the close of the present series of articles in the coming "JOURNAL," in that from Mr. Young and his colleague in this matter (Mr. Samuel Glover) we are to have working drawings of the form of vertical retort setting and the mechanical arrangements necessary to achieve certain operations that they jointly—based upon the experiences in the shale-oil works with which Mr. Young has been so honourably identified as a worker and inventor—have devised as being applicable to the requirements of the coal-gas manufacturer. And also later on we are to have the pleasure of making public an account of an arrangement of producer that Mr. Young has now under consideration for the manufacture of the form of gas that he correctly perceives is the type of gas that is now required with modern forms of gas-consuming appliances—that is to say, a gas having a calorific value higher than water gas obtained by the use of coke, but lower than ordinary coal gas, if it can be manufactured and supplied at a lower price per thermal unit, and provided it is sufficiently free from carbonic oxide to be safely used for domestic purposes. We are here anticipating the announcement with which Mr. Young concludes the article to be published next week; but it will have the effect that we wish it to have, of ensuring that the highly important articles, under his name, in this and the next issue shall receive the fullest attention and consideration.

The second contribution to the subject this week is the translation of a paper by Herr E. Körting, the Chief Engineer of the Berlin works of the Imperial Continental Gas Association. The paper will chiefly engage attention for the consideration that it gives to the Woodall-Duckham vertical retort setting, as the result of a visit of inspection to the Bournemouth works which Herr Körting has been enabled to make. There has been a prohibition, which the technical press has honourably observed, in the matter of publishing anything about this system other than the description of the construction and process as unfolded in the patent specifications, until the patentees were confident that their results could be repeated on large-scale working, and until the mechanical arrangements and the regulation of the integrant methods could be said to make a perfect whole. Herr Körting, while not publishing figures, has, his paper shows, obtained a privilege that no one else has yet secured in being allowed to make public reference to the good points of the system and to the difficulties encountered, and which have been or are being overcome. There is—we will not commit ourselves to saying certainty, but the strongest possible reason for the final preceding words, inasmuch as we know that there is not a difficulty or defect mentioned by Herr Körting that, during the probationary period, Mr. Harold Woodall and Mr. Duckham themselves have not recognized, and have set themselves to remedy, and that at length (the inventors may be, to quote Herr Körting, optimistic, but their optimism has certainly been of that suppressed character which has commanded secrecy rather than publicity) they and the Directors of the Bournemouth Gas and Water Company are satisfied that the process is sufficiently trustworthy for the investment of capital in its extension at their works.

What Mr. Woodall and his collaborator have been aiming at is, by a combination of correlative processes, a continuous carbonization of coal, and the utilization of the waste heat of the spent charge in the production of steam to form water gas in the lower part of the retort, in order to arrive at a large yield of gas per ton of coal carbonized. The gas so made is, of course, of lower quality than the Company's Acts demand of them. Herr Körting is generous in his appreciation of what the Bournemouth workers have achieved; but he is a strong critic of difficulties and weaknesses, which, as we have said, there is reason for thinking—at all events, all who are disinterested must hope—have been positively surmounted. There is the question of a want of uniformity in carbonization being caused by the need for regularity in the discharge of the coke through the outlet common to four retorts at the bottom; the coke itself is good, but it has been, by insufficient alacrity in removal, supersaturated with water; the admission of steam has required regulation; and there is also the question of the effect upon the retorts of the admission of steam in any considerable quantity. But while Herr Körting points out these difficulties, it will be seen, by careful reading, that he himself points out that remedies have been, or are capable of being, applied.

A most important matter is the deteriorating effect of the admission of steam upon the soundness of the retorts; and as to whether the enormous yields of gas can be maintained when defects begin to appear in the retorts. As Mr. Herring showed in his recent articles, experience in the shale-oil works suggests that the more steam that is used the better for the objects they have there in view. Both Dr. Bueb (at the historic inspection by engineers of the Dessau vertical retort in September last) and Herr Körting have declared it as their opinion that the admission of regulated small quantities of steam will have no noticeably injurious effect on either the calorific or illuminating power of the gas, nor (with care) on the retorts, but will assist in the higher production of ammonia. The increased recovery of ammonia by this means is an important feature of Mr. Young's articles, and of his and Mr. Glover's plans; and it is the direction in which Mr. Herring is looking for one of the principal recommendations of the vertical system. But it does not appear, on the face of the information available, that the Bournemouth investigators had any other but the increased yield of gas in view in turning to profitable account the waste heat of the spent charge in producing steam, and in converting that steam direct into water gas. However, here we have one

point on which there is now, among vertical retort investigators, almost general agreement—that, with the vertical retort, advantage is to be realized by the admission of steam during, at any rate, part of the period of carbonization.

It will also be seen next week that in a measure (although the Bournemouth setting is not specifically mentioned) the methods that Messrs. Woodall and Duckham have adopted in their system of carbonization approach nearer to those fundamental principles that Mr. Young—with his long experience—and Mr. Glover conceive to be the correct ones, than do those upon which the Dessau form of setting is established. Mr. Young and Mr. Glover are satisfied that the best results, in the gasification of the volatile hydrocarbonaceous and nitrogenous constituents of coal, is to be obtained by feeding the coal into vertical retorts in a continuous manner, so that it will be subjected to increasing temperature. On the other hand, we have it distinctly shown, in his closing articles, that, in Mr. Young's opinion, the method of carbonization—with unequal temperatures from the outside to the centre of the charge—in the Dessau retorts is not the one by which complete and uniform gasification can be secured. Furthermore, on the question of the utilization of steam, as the central core of uncarbonized coal forms the channel through which the gas escapes, so must it also be the path of least resistance to any admitted steam; and therefore the maximum benefit to be obtained from steam admission will, in vertical retorts, not, for obvious reasons, be secured in the Dessau system of working. If this be true, then Herr Körting need not be too modest over the quantity of steam admitted, on the ground alone of peril to his retorts.

There are many points in the matter before us this week upon which comment could be made; but they cannot all be mentioned. Herr Körting, however, has yet something more to tell us about the illuminating power of the gas from his 5-metre retorts and also as to his fuel account. If we do not hear before, perhaps the June meeting of the Institution will afford a favourable opportunity for a communication on the Mariendorf and Dessau settings by Mr. Körting; and then all the particulars may be ready for publication. On that occasion, too, it would be valuable to have a paper from Mr. Young. Meanwhile it must be freely admitted that the fresh additions to the subject are of immense value, and that head and front of all that has been published, are, for their guiding virtue, the learned contributions of the last-named gentleman. Guidance is wanted; for although practical working so far has gone some way towards, the distance is still great to, finality.

Hostility to Private Enterprise in Parliament.

In the contest between private enterprise and municipalization, the position for the former has, within the short space of a few weeks, assumed what must be regarded as a most serious aspect by independent thinkers, whose thoughts are not actuated and whose opinions are not fashioned by partisanship and prejudice. Private enterprise is menaced by the preferential treatment of municipalities in the "High "Court of Parliament," where of all places, in the greatness of the number of counsellors, equitable judgment might be expected and looked for with surety. It is to be deeply deplored that the relative claims of private and municipal enterprise should have been lifted from a common plane into the realm of party politics, and that the constitution of the House should be such as to give to the one side an unassailable predominance. There were glimpses of what would happen early in the year. Since then, shadows have taken material form; and predictions have become realities. Never were there safer prophecies than those made on this point when the great weight of Municipalism of the Progressive type was found in the composition of the new Parliament. Municipalization was not a capital item in the programme of the winning side on which the General Election was fought. It was kept fairly well in the background; but incidental reference showed it was only a latent question waiting for developing opportunity. The ominous hints of Ministerialists during the progress of the campaign have rapidly taken form; and we now see clearly their full import. When the Prime Minister uttered the well-remembered phrase, "We "can do all that in us lies to prevent the Central Depart-"ments from being in any sense a drag on local enterprise, "and make those departments stimulate and inspire;" when Mr. John Burns gave the assurance that "private "enterprise shall get fair play and just treatment, and muni-"cipal activity will be similarly treated;" when later Mr. Burns also said "my ministerial exertions shall include the "relief of municipal activity"—little was it then thought how despotically was the great power to be so soon possessed to be wielded in the attempt to clear away all obstructions to municipal trading, nor how soon was the President of the Local Government Board to eat his own words as to private enterprise receiving "fair play and just treatment."

Fair play and just treatment, forsooth! Both are formless and meaningless expressions to-day in the House of Commons when private enterprise essays to cross the track laid for the unimpeded progress of municipalization. Where is there a trace of fair play and just treatment in the servile acceptance and following by the Government of the careful plans of the London County Council for clothing them with the rights and privileges of electricity bulk and power supply in London and over a considerable area beyond their statutory territory? Never has Parliament, in any domestic matter, shown less dignity and less independence, never has it dragged its supremacy so deeply in the mire, as has the present one in slavishly complying with the behests of the County Council, as related this and last week in our "Electric Lighting Memo-"randa." Parliament has declined to submit the privately promoted Bills to the Hybrid Committee who are said (it must be facetiously) to be charged with the consideration of the "whole subject" of the bulk supply of electricity to London; the "whole subject" having for its sole foundation the County Council Bill. The privately promoted Bills have been kept outside the purview of the Committee. For what reason? Because "in things of this sort"—this being the dictum of the President of the Board of Trade—"priority ought to be given to the schemes of the rate-"payers." That is what we have come to under the new order of things. However, had the privately promoted Bills been referred to the Committee, no one interested in private enterprise could have had the least confidence in the measures obtaining fair and impartial treatment. On the Committee of nine, there are two Labour members (and Labour is pledged to municipalization), one Irish Nationalist, four Liberals, and two Unionists; and the question of Private Enterprise *v.* Municipalization has been made a Party one! Need anything more be said on this particular point? The Additional Power Company pressed their Bill for second reading; and, in what we suppose is Mr. Lloyd-George's notion of courtly and dignified language from a statesman and of just treatment and fair play by Parliament, he recommended the House to "give the Company a lesson," for what he evidently regarded as their impertinence, by summarily rejecting the Bill. The House obliged. The incident reminds one of the bully and the small boy of our school days. The lesson the Company and private enterprise generally have received is that "priority" will be "given to "the schemes of the ratepayers" by the present Parliament. Before the division on Tuesday, one honourable member bid the House refuse to grant any more monopolies to private companies in opposition to municipalities.

All this is happening in the early days of the new Parliament. Is this injustice, this degradation of statesmanship, this attempted legislation on the insecure foundation formed of prejudice and antipathy, the result of an intoxication produced by the sudden possession of plenary power to purpose and to do, and to give embodiment to ideals and schemes, in furtherance of the municipalistic creed? There are those who think so, and that there will be abatement. There are, however, others who are of opinion that, when the ultraists in Parliament further "feel their feet," they will go to the extreme in these matters. We rather hope that the former than the latter is the truth. But who can say? The prospect anyway is not at all pleasant for private enterprise; but private enterprise must hope that the better sense of the moderate Liberals will cause them to sever themselves from the extremists, and assist Justice in this matter to reassert herself. Do the moderate Liberals who at present help, by their votes, the end to which a decided trend has now been given, know the intention of those who influence? It is this: Through municipalization the advanced Socialists are hoping to open up a highway which will take them to the destination where practical form will be given to their theories and doctrines. Temperate and judicial consideration of these matters is what is now wanted; recent proceedings have shown intemperance and anything but a judicial spirit. What Parliament has done by the decisions of the past two

weeks in connection with this electrical power supply scheme for London has been to make clear the road for further speculation on the part of a Council whose gross debt, together with its present and prospective commitments, represents nearly 99 millions, in which great ocean of outlay the proposed expenditure of about 2½ millions on the electricity scheme looks but a drop. If the amounts lent to other authorities are deducted, as well as the value of the property owned by the Council, their net debt is still about 45 millions. These are, in truth, remarkable figures. Is it to be wondered at that people are thankful now more than ever that there exists an Upper Chamber, the members of which will find plenty of occupation in prudently restraining and rectifying the indiscretions of the Lower House? At the present rate of progress, the Commons will soon give the Lords an abundance of work to engage their serious attention.

Liabilities for Default and Damage.

THE law regarding the question of the liability for penalties and damages in the case of default in connection with public supplies appears to be but little understood. Where an accident creates such a disturbance of the distribution system as to cause failure of supply to a person or persons, and Special or General Acts of Parliament prescribe the penalty for default, then, beyond that penalty, no action will lie for consequent damages—that is to say, damages brought about through the interruption of the supply, apart from any immediate injury occasioned by the accident itself. This has been held over an extended course of years to be the legal position in this particular regard in relation to gas and water supply; and therefore we cannot see what foundation for their hope to recover damages the plaintiffs had in a case tried at the Leeds Assizes the other day in connection with electricity supply under circumstances corresponding to those stated above.

The plaintiffs were Messrs. Margerison and Co., who, in their capacity of wool merchants, used electrical energy supplied by the Bradford Corporation. An explosion in the neighbourhood of their premises caused a suspension of the supply of the electrical current, and of their business, for three-and-a-half days. The plaintiffs alleged that the Corporation were cognizant of the dangerous condition of their electrical distribution system at this point; and therefore that they had been guilty of negligence. Therefore plaintiffs sought to recover damages amounting to £156 14s. The question of whether or not there was neglect in regard to the condition of the system does not come into consideration, seeing that there was no violence occasioned by the explosion itself. The Electric Lighting Clauses Act, 1899, distinctly defines that the undertakers shall be liable, "in "respect of each default, to a penalty not exceeding 40s. for "each day on which the default occurs." There is a little variation between the diction of this penalty clause and that in the Gas-Works Clauses Act, 1871; but they amount to the same thing. And it has, as already stated, been held (to quote "Michael and Will") that "where a gas company "become liable to penalties for neglect or refusal to supply, "it follows that no action will lie for damages, and that the "penalties form the only remedy." This is the outcome of the decision in *Atkinson v. Newcastle Water-Works Company* in 1877; and the same thing has been held time and again in several cases, and not only in respect of such services as gas and water. The Bradford Corporation, therefore, very properly contended that their liabilities for failure to supply were defined by Act of Parliament at 40s. for each default, and that consequently they were not liable for any damage beyond. In his judgment, Mr. Justice Bigham supported this contention—regarding the prescribed penalty as the punishment Parliament thought it right to inflict.

If the law was contrary to the Corporation's plea and the judgment, public supply of such commodities as gas, electricity, and water would impose an intolerable burden on the undertakers. If all consumers on an interruption of supply could succeed on actions for damages for injury to business and so forth, there would be no end to the claims and to litigation of this kind—particularly in connection with electricity supply. Such never-ceasing liability would be an impossible condition to attach to any such businesses. Perhaps its only excellence would be in the retarding influence it would have on the extension of municipal trading. But no trading concern of the character could exist if subject to the constant attacks of all the consumers who suffered an interruption of supply, or who fancied they had sustained injury in respect of insufficiency (as in the gas case of *Clegg, Parkinson, and Co. v. Earby Gas Company* in 1896), which entitled them to damages beyond the forfeiture defined by the Act.

The Informal Meeting of Scottish Gas Managers.

THE Informal Meeting of Scottish Gas Managers—now an annual event—took place in Glasgow last Wednesday. We have the authority of the Convener of the meeting (Mr. W. B. M'Lusky, of Perth) for the statement that it was a record one, the attendance numbering upwards of 150. It was certainly a pleasant gathering, for, as has been said on previous occasions in this column, there are no formalities to intervene between those who attend and the work they have come to do; and, getting at that work without hindrance, the spirit of freedom from trammel seems to pervade the remarks, which thus flow liberally and spontaneously. It may be that much that is spoken is of light quality; but out of the bulk it is possible to sift a proportion of wheat, sufficient for the sustenance of managers who are hungering for new ideas, or for corroboration of their own formed opinions. Mr. W. M'Crae, of Falkirk, who presided, gave an address of a plain description, but one which can be characterized as an all-round good one. He covered so much ground, and treated of the various subjects so sensibly, that there was abundance of material upon which to make comment; and comment unstinted was the result. Such a meeting shows how fashions change, even in industrial pursuits. Only a few years ago, the enrichment of coal gas was a leading theme of discussion at the Informal Meetings; this year it was never mentioned. The points most dwelt upon were those of charging-machines, vertical retorts, and public lighting. The vertical retort has not been seen as yet in any gas-works in Scotland, though Mr. A. Waddell, of Dunfermline, hinted that he had heard that there had been some experimenting with them; and they are quite common in the oil-works in West Lothian. Upon the subject of vertical retorts, the remarks made by Mr. J. W. Napier, of Alloa—himself an old oil-works man—are worthy of note, being, to all appearances, well supported with reason. Charging-machines were spoken of more pointedly, because they have been seen in operation. There has not yet, however, been time for the gathering up of Scotch results from the working of the two of the projector class which are in use on opposite shores of the Forth. Consequently, what was said was more general than it will probably be again. As to public lighting, there seems to be among gas managers a decided waking up on the subject. What was said upon it by Mr. Alex. Yuill, of Dundee, Mr. D. Robertson, of Dunoon, and others, will doubtless be useful to those managers who have not yet gone far into the question. An interesting feature of the meeting was the appearance, for the first time, of representatives of the Scottish Junior Gas Association. This incident serves to illustrate the cosmopolitan nature of these Informal Meetings. In conclusion, it may be recalled that the meeting has now been held consecutively for twenty-three years; and it is safe to say that its growth and present position testify to its fulfilling a very useful purpose in the furtherance of the interests of gas managers in the North.

Dr. Pole's Formula.

It is perhaps hardly necessary for us to draw the special attention of "JOURNAL" readers to an article which appears in another column on Dr. Pole's formula for determining the discharge of gas through pipes—for it bears above it the name of Mr. F. S. Cripps, which is sufficient guarantee that it will receive full consideration at the hands of his fellow engineers. Mr. Cripps is not a writer the extent of whose labour is to be judged by the length of his articles; for on such subjects as those with which he deals, very little space is needed to record the results of many and many an hour's work. On the present occasion, for instance, it is certainly not too much to say that every variation and rule that can be obtained from the well-known formula in question has been extracted from it by Mr. Cripps. Hitherto only a few variations and axioms have been published; but our readers will find that very considerable additions have now been made, and been grouped together so as to be available for ready reference.

Allusion is made to the tables of Mr. Barlow, which were founded on this formula, and to Mr. Newbigging's extensions and additions; while Mr. Cripps's own diagrams, which were published some fourteen years ago, for graphically solving the various problems connected with the flow of gas, were based on the same formula, and were greatly admired by Dr. Pole himself.

The War Chest of the South Wales Miners.

Unless some strong steps are taken, there appears to be a very good prospect of the South Wales Miners' Federation becoming of but little account as a fighting machine. A Welsh correspondent of the "Daily Chronicle," in the course of an article on the subject, states that recently the Treasurer of the Federation confessed in a public speech that, in the event of a general strike, they would not last a fortnight. Last year the total amount of the contributions to the general fund was £41,957; the total receipts of the fund reaching £46,896. On the other hand, the amount distributed in strike pay alone (and this in a time of general peace) was £47,492; while the total expenditure from the fund was £66,600. At the close of the year, the sum which, in the event of a general strike, would have been available for working expenses and strike pay for the 110,963 members, was only £57,968; the remainder of the £132,111 which constituted the total Federation money being locked up in district and lodge funds. The suggestion of the leaders is that the South Wales Federation should do as all the other federations connected with the Miners' Federation of Great Britain do—levy from the members 2s. a month, instead of 1s. This is a course, however, which the members naturally do not favour; and something that would increase the popularity of the Federation is badly needed just now, seeing that since 1902 the membership has shown a continuous falling off. The question to be settled is a difficult one. Shall the Federation remain, as it undeniably is now, useless as a fighting machine, or shall unpopularity (and a further falling off in membership) be risked by increasing the levy? Whatever may be the outcome of the quandary in which the men's leaders thus find themselves, the coalowners, and those engaged in the coal trade generally, will doubtless breathe more freely so long as the Federation remains in its present crippled state, and powerless to plunge the whole industry into trouble and turmoil. A too full war-chest is perhaps a little apt to blind its possessors to the more lasting advantages of peaceful settlements.

Gas Matters in Dublin.

Owing to causes the effects of which have been felt in many other places—the rapid growth of the incandescent system and a mild winter—the Alliance and Dublin Consumers' Gas Company are able to report an increase in consumption during the six months ending Dec. 31 of only 1·7 per cent., compared with the last half of the preceding year. In the matter of weather, however, gas proprietors, like other people, must endeavour to be content with what is vouchsafed to them; while as for the increasing use of incandescent gas-burners, this, as we have many times remarked, and as the Dublin Gas Company fully recognize (for they are doing all they can to encourage it), is in reality a great blessing. The smaller consumption thus required is more than counterbalanced by the greater satisfaction that the incandescent system gives rise to; while its value as a weapon with which to meet the competition of electricity is, of course, inestimable. In another direction—and it is to be feared without any compensating advantage—the Company have experienced a large falling off in receipts; the market for residuals, and more particularly coke, having been in a very depressed condition. The result is that, in spite of the fact that gas and meter rents showed an increase of about £1350, the usual dividends could only be paid by dipping to the extent of nearly £3000 into the reserve fund for the equalization of dividends. Under these circumstances, the Company have seemingly found it necessary to increase the price of gas; though the Chairman (Mr. W. F. Cotton) declined, in answer to a shareholder at the recent meeting, to furnish any information on the subject.

The Question of Illuminating Power.

Doubtless Mr. Cotton had some good reason for preferring not to discuss the matter; but the occasion proved, as was perhaps natural, too good for the "Freeman's Journal" to pass over, and their leader writer waxed most eloquent regarding the Chairman's "closure" of the proprietor's question. In the writer's desire, however, to prove that any increase was not justifiable, he unfortunately placed an entirely wrong construction upon a portion of the Chairman's speech—and this, of course, vitiated his own argument. In the course of his remarks, Mr. Cotton said that "recently a very radical change had been introduced into gas legislation. In London and many of the large cities and towns the standard for illuminating power had been reduced from 16 to 13 and 14 candles, when tested with a standard argand burner—a burner which had been specially constructed for obtaining from the gas the greatest possible amount of light." Being himself apparently misled by this, the writer in question hastened to similarly mislead his readers, by stating that: "Under these circumstances, it is, of course, quite natural that the Company should produce and sell the cheaper article"—thereby naturally leading the public to think that the Company are using the burner referred to for testing their gas, whereas in reality they are compelled to produce 16-candle gas tested with a flat-flame burner. The consumers would have plenty of notice of any change in this respect, because before it could be carried out it would be necessary for the Company to obtain a Special Act. Says the "Freeman's Journal," "every ratepayer is in himself a proprietor of the electric lighting system." This is doubtless true; but nevertheless a little pains might in fairness be taken to properly understand the position of the Gas Company.

PERSONAL.

We regret to learn that, owing to ill-health, Mr. F. W. Chamberlain has resigned the position of Manager of the Bombay Gas Company, Limited. The appointment of a successor is at present under the consideration of the Board.

Mr. Philip Moon, Assistant to Mr. Thomas Glover at Norwich, has been appointed to a similar position under Mr. Harold W. Woodall, the Engineer and General Manager of the Bournemouth Gas and Water Company, in place of Mr. A. M'D. Duckham.

Mr. R. J. Lukey, the Secretary of the Australian Gaslight Company, is about to visit England, and will leave Sydney in the *Himalaya* on the 25th inst. As it is sixteen years since he left the Old Country to take up his abode in the capital of New South Wales, he will find many changes on his return; but none, we venture to think, in the feelings of his many friends on this side towards him.

We regret to learn that Mr. T. H. Goodwin Newton, who has been a Director of the Imperial Continental Gas Association for a period of 39 years, has been obliged, owing to failing health, to resign his seat on the Board. He was elected an Auditor of the Association in May, 1863, a Director in February, 1867, Deputy-Chairman in 1890, and Chairman in 1895. This last position he held until he resigned it, for reasons of health, in 1903. To fill the vacancy thus caused, the Board have elected Mr. Hugh Goodwin Newton, son of Mr. T. H. Goodwin Newton.

As will be seen from the report of the meeting of the Swansea Gas Company which appears in another column, the Chairman (Mr. T. Travers Woods) made kindly allusion to the fact that on June 1 next Mr. Thornton Andrews, the Engineer and Secretary, will have completed fifty years' service with the Company. The shareholders present, we are glad to see, passed a well-deserved resolution empowering the Directors to recognize, in such manner as they might think fit, the completion by Mr. Andrews of this lengthy period of good work. Fifty years is a long time to look back; and, of course, Mr. Andrews has seen most wonderful changes in Swansea since June, 1856. At that date, for instance, the sale of gas was 12 million cubic feet; whereas it is now no less than 400 millions. May Mr. Andrews be spared to see even the latter figure left far behind by the continuous progress of the undertaking whose welfare he has so much at heart.

OBITUARY.

We regret to announce the death, last Tuesday, in his 75th year, of Mr. Thomas James Church, who for 41 years held the position of Manager of the Brentwood Gas Company, and during the last five years had been their collector. Shortly before his death, he received from the Secretary (Mr. C. A. Fielder) a letter conveying the deep sympathy of the shareholders, expressed at their ordinary general meeting, with him in his severe illness, and recognizing his faithful service to the Company in the capacities named. Deceased was the only brother of the late Mr. Jabez Church, formerly the Engineer of the Chelmsford Gas Company (a Past-President of the British Association of Gas Managers and of the Society of Engineers), who died in May, 1875; while his son, Mr. F. W. Church, is Secretary of the Gas-Meter Company.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 126.)

THE week just closed in the Stock Exchange was a rather disappointing one on the whole. At the opening, everything looked favourable in matters international, colonial, and monetary. The Algeciras nightmare was relieved; the South African knot was disentangling; and cheaper money was a certainty, or next to it. The time seemed really ripe at last for business to take its long deferred start. But somehow or other nothing came of it. Extreme caution was still the order of the day; and for the rest of the week business remained dull and very quiet. It was evident that confidence—a very shy bird when once scared—was a long way from being thoroughly re-established. In the Money Market, the feature of the week was the reduction of the Bank rate on Thursday to 3½ per cent. from the 4 per cent. rate which had ruled since Sept. 28. In the Gas Market, the volume of business was still only moderate on the whole; and one or two days were very quiet indeed. On the other hand, the tendency was better than that which characterized the preceding week. Actual changes in quotation were few in number and slight in degree; but they all indicated that gas stocks in general are inclined to rise. In Gaslight and Coke issues, the ordinary was moderately active, with an improving tendency. Among the earlier prices were transactions at 97⅝ and 97½; but the figures thenceforward gradually hardened till on Friday 98¾ was touched—a rise of ½ in the quotation. Of secured issues, the maximum changed hands at from 88½ to 89½; the preference at from 108½ to 109½; and the debenture at 89. South Metropolitan was rather more active and firm, with a slight tendency to improve. The opening price was 127½, but 128½ was afterwards reached; and several parcels of stock changed hands at these figures. Commercials continued as quiet as they have been for some time past, and were unchanged. Business in the 4 per cent. was done at 115½; and in the 3½ per cent. at 116½. Business in the Suburban and Provincial group was at about its average pressure, with indications of firmness. Bournemouth "B" marked 17¼, Brentford old 264, and ditto new had an advance of 3 in its quotation, but was not dealt in. Brighton original was done at 234, British at 43¾, South Suburban at 121, and small amounts were done free in Hastings 3½ per cent. at 98½, and ditto 5 per cent. at 121½. In the local Exchange, Liverpool "A" and "B" advanced 1 each. Among the Continental Companies, Imperial was quiet and very steady; transactions being marked at prices ranging from 232½ to 233½. The debenture rose a point, but was not dealt in. Union changed hands at 130½, European at 23¼ and 23¾, ditto part-paid at 17¼, and Tuscan at 10½ and 10⅝. Among the undertakings of the remoter world, Bombay was done at from 6⅞ to 7⅛, ditto part-paid at 5⅛, Buenos Ayres at 12⅞, Monte Video at 12⅝, River Plate at from 13¼ to 13½, Primitiva ordinary (the next dividend upon which is announced to be at the rate of 7 per cent.) at 7 1/16 and 7⅛, and ditto debenture at 98⅜.

The closing prices are shown in our Stock and Share List on page 126.

ELECTRIC LIGHTING MEMORANDA.

Parliamentary Injustice—Teaching Private Enterprise a Lesson—The London County Council's Wiring Clauses—Struggling for Success against Inside and Outside Competition—Illuminants and Fires—The Electricity Business in Dublin.

THE London County Council having taken possession of the members of the Government and of a majority of the rank-and-file of the House, and having issued their instructions to them as to what is to be done in regard to matters relating to the Metropolis, "Imperial Parliament" are complying to the letter with the dictation. Everything indeed is being made beautifully comfortable for the easy passing of the County Council Bill through the Lower House; and if anyone dares to submit, even in the most respectful and timorous manner and tone, that they have the right to receive equal consideration with the County Council in this matter, their scheme is arbitrarily given the "happy despatch." That at all events is what has happened to the Additional Electric Power Bill. The promoters of this measure were not satisfied with getting *locus* in connection with the County Council Bill; and so they asked Parliament to deal with their Bill in the ordinary course, with the result that it came up for "second reading," or rather execution, last Tuesday night. The County Council representatives had some days before sounded the alarm; and the members trooped to the House to take part in the ignominious act. The rejection of the Bill was moved and seconded; and one after the other members stood up and talked of wicked monopolies and monopolists and of the occult benefits of wholesale municipalization. When the honourable gentleman with the delightfully euphonious name of Summerbell expressed the hope that "the House would refuse to grant any more monopolies to private companies in opposition to municipalities," the remark met with the highest approbation; and that is correctly expressive of the attitude of the supreme party in the present Parliament in relation to private enterprise (other than their own) and municipalization. The President of the Board of Trade (Mr. Lloyd George), too, feeling strong with the big majority behind the Government, asked the House to teach this Company "a lesson" by rejecting their Bill. "Teach them a lesson!" What for? Merely for having the temerity to request that their privately promoted Bill might at least receive ordinary consideration at the hands of a Committee concurrently with that of the County Council. In other words, they desired justice, and that the merits of their Bill might be examined. The House cheered Mr. Lloyd-George; and proceeded to "teach the lesson" by, without knowing anything as to the nature of the scheme, refusing, by 197 votes, to give the measure a second reading.

While protesting against the injustice that this exercise of might against right threatens to inflict on private enterprise, there need be no discussion over the question as to whether, by their arbitrary treatment, the House has not saved the Additional Company money. It is as certain as anything can be that they have. The County Council Bill, so far as the House of Commons is concerned, might just as well go through the remaining stages without further consideration. It has been referred to a Hybrid Committee, five of the members of which were appointed by the House and four by the Committee of Selection. On this Hybrid Committee of nine, there are four Liberals, two Labour members, one Irish Nationalist, and two Unionists. The proceedings are entirely farcical. The Government profess that they desire the "whole question" of the supply of electricity in bulk within the London area to be considered by the Committee. The composition of the Committee is sufficient to convince that the "whole question" will not be considered; and how can it be when there will merely be before the Committee the scheme of the London County Council? The merits of their scheme can only be properly assayed in conjunction with alternatives. If the Government sincerely desired that the "whole" question should be examined, they would not have had any hesitation in referring all the schemes to the Committee for consideration, and to a Committee better balanced than the one who will sit and hear the best and worst that can be said for the County Council project, and then (so everybody now expects) will declare the preamble proved, and report the Bill for third reading. The turn, however, of the House of Lords is yet to come.

Great as has been the waste by the Council over parliamentary business, they have never had such rollicking times as they are having, and are going to still further have, in Parliament this session. Their General Powers Bill is going through the Lower House unopposed, with the wiring clause for the Borough Councils intact. Several London Electric Supply Companies obtained *locus* against the Bill, but withdrew, possibly because they knew that, in the House of Commons under present circumstances, they would only be throwing away their money in opposing. But there is still the House of Lords; and there the opponents will get their chance. It was in the Lower House last year that the proposed clauses were amended, with the view of making the wiring business self-supporting; it was the Lords who refused the extension of the trading powers of the Borough Councils. Three times the County Council have been repulsed in their attempt to obtain this power for the Borough Councils; and it is to be hoped that the Lords will again confirm their own action of past sessions. If the clauses eventually go through, there is one point for gratification, that they provide that the charges shall be so adjusted "as to meet any expenditure" by the Borough Councils "under the powers of the section, including interest upon any moneys borrowed under, and for the purposes of, this part of the Act and payment of sinking fund in respect of such moneys." Separate accounts, too, are to be kept of the wiring business.

Most of the municipal electricity undertakings of the Metropolis are glad to try anything to get a more substantial business for their undertakings, even to the risking of money on the wiring of consumers' premises. We are afraid the part of the provision referred to in the foregoing paragraph, as to making the financial ends of the business meet, will in time become a dead-letter in some cases, through absolute helplessness in this matter of the Borough Councils. The consumers whose houses will be wired under the power, if it is eventually obtained, are just of the class who will not continue their patronage of electricity if they find it more costly than incandescent gas lighting; and as they drop off, who is to bear the expense attaching to the unproductive wiring and fittings? Assisted wiring may be one means of temporarily aiding business; but the Councils want to find others. The Mayor of Woolwich has invited the ratepayers to attend a public conference "on the electricity works, and how to make them a success." His Worship has apparently greater faith in the business ability of those who are outside the Borough Council than the actual members of that body. Meanwhile, the Council are going the old way to work in making a "success" of municipal electric lighting undertakings; for we see that they have authorized the Works Committee to have all the side-street gas-lamps on the route of the existing mains converted to electric lighting. We are getting into a somewhat confusing state in the struggle for "success" of the London municipal electricity undertakings, and through competitive undertakings. There is the Southwark concern, whose owners have been trying to assist it to a healthy financial condition by making a charge for public lighting at 2·52d. per unit. And now, without any warning, the London Electric Supply Corporation come down on the Council with an offer to supply them with current for the public lighting

at 1½d. per unit—1·02d. cheaper than the Borough Council are charging their own ratepayers. This is really too bad—from the point of view of the Electricity Department, though it may not be from that of the ratepayers. But there is another feature that looks something like a threat. The Electric Supply Corporation not only make the offer, but "hold themselves at liberty to communicate the offer and the reply they may receive from the Council to the London County Council and the Local Government Board." The General Purposes, Law, and Parliamentary Committee of the Southwark Council are looking into the matter. It comes hard on the Borough Councils to be pressed in this fashion, when all their power is required to resist the ever-active Gas Companies. All round, the electricity concerns are being compelled to reduce their prices; and, as the Chairman of the Lighting Committee of the Islington Council admits, the reductions are necessarily drastic ones. In their own case, they have abolished the maximum demand system, and have reduced the flat-rate for lighting from 5d. to 3½d., because the Committee feel that "the time has come when, with the competition of incandescent gas, coupled with bad trade and hard times, they must make a thoroughly drastic alteration."

Our generous friends of the "Electrical Review" have published a paragraph showing the fearful danger of gas as a creator of fires; the "forcible" illustration of this being obtained from the annual report of the Fire Brigade Committee of the London County Council. In all, during the twelve months 407 fires are said to have been "directly caused," in the Metropolitan area alone, from the use of gas. That is a positive statement; and comparing it with the next line, one has a good example of the skilful editing of our contemporary in toning down all evidence detrimental to electricity. "In comparison with the foregoing," says our contemporary, "the fires caused by, *or attributed to*, electricity are only 73." Why did not our contemporary also use the qualifying words "or attributed to" instead of "directly caused by," in dealing with gas? We hope the members of the electrical industry are not quite so imprudent as the "Review" in thinking there is capital to be made out of these figures; for if they will only apply one simple test—that of the ratio of fires to consumers—they will at once find that gas lighting is the less risky system of the two. The area covered by the operations of the London Fire Brigade is considerably greater than that occupied by the three Metropolitan Gas Companies. Within the areas of these three concerns, however, there were, according to the most recent returns, some 812,775 gas consumers; and if the figures were available for those portions of the Suburban Gas Companies' districts that come within the range of the operations of the London Fire Brigade, the number of consumers would be greatly extended. We cannot find the exact number of electricity consumers within the areas of the Companies and supplying Borough Councils of London; but if we take the 31 undertakings mentioned in the "Electrician's" last published "Tables," whose undertakings cover a far greater area than that of the three Metropolitan Gas Companies, we can make a calculation that is near enough for our purpose. It is impossible to give complete figures as to consumers, as there are electricity undertakings whose conductors appear to be shy of letting the world know the number of their customers; preferring to give the handsome-looking conversion of connections to 8-candle power lamps. There are in the table some half-dozen of the undertakings that do not return the number of consumers; and the whole of the 25 which remain can only boast of less than 50,000. Supposing we are liberal, and assume that the other half-dozen concerns have between them 20,000 consumers, this would make 70,000 in all. The "Review" has recently been speaking of gas people as our "boastful enemy," the use of which expression is a symptom of irritation over hard knocks. We hope the writer of those words will not ascribe this enlightening paragraph to any desire on our part to be boastful over the question of fires; but if he will condescend to make a little arithmetical calculation, he will find that the fires that were caused by gas in the Metropolitan area only equalled one in about every 2000 consumers, while those caused by electricity are equal to 1 in every 1000 consumers—giving to electricity all the advantage pointed out in regard to dissimilar area and the liberal calculation as to electricity consumers.

There still seems to be some amount of uncertainty in people's minds about the predicted glorious future of the electricity undertaking of the Dublin Corporation, upon which future a great deal of eloquence has been expended in the municipal chamber. Ever since the undertaking was reported to have "turned the corner," which corner it had been a dreary pull to reach, the improved financial position has been a frequent theme for public congratulation. But directly afterwards there has generally been talk of further loans. As to the future, the Corporation are again taking up considerable further loans for the undertaking; and, as there is a little coyness on the part of financiers in Dublin, there has been negotiation with London and Glasgow firms, and two loans of £50,000 each have been arranged at 3¾ per cent. interest. In addition to these 3¾ per cent. loans, according to the Lighting Committee "enormous extensions have been entered upon for which provision of repayment of capital has had to be made, but from which no income will, in the ordinary course, be derived for some time to come." Again, the undertaking has to meet payments on old unproductive loans, and "in building up a business for the future," of more than £7000 a year. Consider this statement as to the unproductive loans, and the considerable extensions and construction of new works, in conjunction with a report of the Local Government Board Auditor in which he urges the necessity for an increased depreciation fund. The Committee, in face of their experience as to liabilities in respect of now unproductive loans, hold that the fund should not at present be increased. From this is seen how the Committee are contributing to that dearly earned "profit" which enables them to boast of having "turned the corner." The future does not, when all the claims that have arisen (and will arise) are taken into account, bear such definite promise as has been assumed. It is further noticeable that consumers in Dublin join with London, Brighton, and other places in a dislike to the maximum-demand system; and alternative flat-rates have now been adopted. Yet another point in a recent report by the Committee is that in 1904-5 there were 891 consumers; and in January last, 1058—an increase of 167, which does not appear to be a substantial advance for an undertaking of the magnitude—in capital expenditure—of the Dublin concern. It was only the other week that a statement was made in the Council that electricity consumers were going over to the Gas Company. This is not surprising, if the best that can be done in the way of a general flat-rate for all classes of consumers not specially legislated for in the matter of price is 5½d. per unit. The Committee admit that some consumers may consider themselves dissatisfied, but submit that "the proportion of these cases is so trifling that they really form no ground for the alarmist statements that have been made." In addition, they say that they have had to cut off several consumers for non-payment of accounts; but only five consumers can be traced since 1903 who have had their supply disconnected because "they stated the electricity was too costly." This no doubt is perfectly true; but what about those who for the same reason have discontinued electricity, but have not stated it?

NOTES FROM WESTMINSTER.

EXCEPTING the Police and Sanitary Committee, the Lords Committee on Railway Bills were for the greater part of the week the only judicial occupants of the long range of Committee rooms; but the Unopposed Bills Committee of the Commons did not allow the week to pass without putting themselves in evidence. There are some people who think they have done excellent service in causing deep disappointment to the promoters of the Mid-Oxfordshire Gas Company's Bill. It is the correct thing for a gas undertaking to possess statutory powers; but a Bill or an Act of Parliament ought not to be reduced to a tool in company-promoting projects. The Cheltenham Gas Company's Bill has been relieved of the opposition of the Corporation; and the Llandrindod Wells Gas Bill has been withdrawn. The only other Committees dealing with Gas or Water Bills that have up to the present been appointed will not meet before May day. In the groups of measures alotted to them are two or three containing interesting proposals. There are the Truro and Crediton Gas Bills, the Glamorgan and South Wales Water Bill, the Bills of the Bury and Newport Corporations, and the Cumberland Electricity and Power Gas Bill.

Mid-Oxfordshire Gas Finance and Prospectus.

Those members of the public who have made application for shares in the Mid-Oxfordshire Gas Company will feel somewhat sorry that the tempting prospectus issued to them was successful in uniting their fortunes to the Company before the securing of the Act of Parliament to which conspicuous reference was made in the prospectus. The Company's Bill, it was there stated, had been read a second time in the House of Commons, was unopposed in that House, and its object was to confer upon the Company statutory power of gas supply throughout a large area in Oxfordshire. A business carried on under an Act of Parliament swells in importance in the eyes of the investing public; but it should not do so in all cases. However, it does not do to count on one's chickens before they are hatched; and those applicants for shares who counted upon the Company getting an Act will feel rather uneasy when they learn that the Unopposed Bills Committee have come to the conclusion that the Bill must be adjourned for a while, as they consider the financial position of the Company is not such as to satisfy them that the measure should be passed. But if the Bill does eventually proceed, the Committee are going to insist on the insertion of a clause giving the local authorities the right to purchase the plant. This, of course, will be prejudicial to the interests of the shareholders, and will affect, if nothing else does so, the prospective value of their shares. There has been some talk about this Company in the Committee-rooms, among those interested in the gas industry; and, from a pretty general experience, it is certain that, if the promoters do not get the capital they have been asking for, it will not be for the want of trying. Before the printed prospectus was issued, we had information from shareholders in other gas companies of private communications inviting them to subscribe for debenture and preference shares; and very attractive indeed were the particulars furnished. This private canvass and the extensive circulation of the prospectus among gas shareholders, have been—as have other gas prospectuses in recent years—the subject of much annoyance to

gas company directors and officers, who have been frequently worried by their own shareholders (who think they have a right to financial counsel) for advice as to what they should do. Directors and officials are not backward in describing these new experiences produced by company promoting as "a perfect nuisance." There is no question that amalgamation of small gas companies is a good thing, under favourable conditions, and providing that the capital of the combination is not excessive. It is also unquestionable that there is not "great" scope in a number of towns the aggregate population—not householders—of which is 36,000; nor is the number of consumers in London supplied with gas-stoves any criterion as to the number of consumers who will require to be supplied with these conveniences in Bicester, Chipping Norton, Charlbury, Witney, Woodstock, Bampton, and Eynsham. Furthermore, the lumping together of dividends paid since such remote years as 1849, 1887, 1872, and 1859 in the case of four of the seven undertakings which are to be worked under the new Company, may invite the regard of foolish persons for the stability of such concerns, but the process may also mislead them. Everything that is said in the prospectus may be perfectly true; but everything may not be revealed, and what is revealed may not all be strictly applicable. However, the action of the Unopposed Bills Committee last week (as reported in our "Parliamentary Intelligence") caused some consternation among the promoters, in view of the issue of the prospectus; and there are many people who are wondering what will ensue.

[In our "Correspondence" columns appears a criticism of the Company's prospectus from a contributor who has a large connection with suburban and provincial gas concerns; and he sets forth some of the remarkable features of the document with a clearness which it is hoped will have effect—if not too late—in restraining investment or (if this is the better descriptive word) speculation. It may be added that a representative of the promoters of the Company applied to the Editor of the "JOURNAL" to suppress publication of the report of the proceedings before the Unopposed Bills Committee referred to above. Our reply is the report in to-day's "Parliamentary Intelligence."]

Cheltenham Agreed. The end of all the controversy at Cheltenham over the Gas Company's Bill is agreement, which is a very proper ending, and one which will save the parties a great deal of time and expense. The exact terms of the settlement have not transpired; but the general lines have been reported. Under the Cheltenham Improvement Act of 1852, the Company had power to turn into the sewers, so the statement runs, "practically anything they chose." But the Company have now given way on this—as the Corporation consider it—important point. On their part, the Corporation have withdrawn their opposition to the sulphur clauses, upon which subject, although at first hard of belief, the Corporation are, it is patent, now of opinion that the Departmental Committee's recommendations were too strong for them to break through. The Corporation have likewise seen the reasonableness of not persisting in the claim for the maintenance of the present standard of illuminating power. It is understood that the Company, on the other hand, have made concessions in connection with the testing of the gas and other matters; and altogether it is felt by the Company and Corporation that the time spent at the conference at which the settlement was arranged did not constitute a bad day's work. Anyway, there will be no further waste of money that can be more profitably employed than in parliamentary conflict.

Sulphur Restrictions Opposition. The ranks of the opponents to the removal of the sulphur restrictions from those Gas Companies who have united in promoting the Joint Bill or have separate Bills in which provision is made for the abrogation of the clauses, are still thinning. Some of those who have receded from an untenable position have been mentioned in past editorials; and to-day it is with the greatest satisfaction that we note the withdrawal of the London County Council from among the few remaining petitioners against the Joint Bill. The Cheltenham Corporation, by their agreement with the Gas Company, will not now oppose the sought relief.

The New Mills Bill. Among the fortunate Bills this session is the promotion of the New Mills District Council for additional water and gas powers. The authority are proposing to purchase a water undertaking supplying in four townships in their administrative area, and at present in the ownership of a Mr. Sumner. It was learnt when the Bill was before the Unopposed Bills Committee last Thursday that, under an agreement, the Council are going to pay Mr. Sumner £11,000 for his undertaking. The Council are also proposing to purchase the water-distributing mains in Newtown (which is also in the New Mills area) from the Stockport Corporation. The Local Government Board were represented before the Committee to assure themselves as to the unimpeachable suitableness of the source of water supply. They are in the present day paying great attention to the safeguarding of the interests of the public in connection with water-supply schemes that come before Parliament. In this case, Mr. George Hodson satisfied Mr. Boyce, of the Local Government Board, that there was no danger to be feared regarding the source of supply.

THE OHIO QUESTION-BOX.

The Gas-Making Material and Gas Manufacturing Equipment Sections.

THE reviewing of the subject-matter of one of the volumes constituting the accumulations of a year of the Ohio Gaslight Association's Question-Box is by no means an easy matter. The general reference which we made last week to the newly-issued volume, which has been prepared under the editorship of Mr. Henry L. Doherty, shows that, although the book is smaller than its predecessor, it embodies anything but an insignificant amount of material. In fact, when one gets 455 printed pages made up of questions and answers—571 of the former, and 3620 of the latter—it is useless to attempt more than exemplification of the contents. The questions are collected into sections under eighteen headings, as follows: (1) Gas-Making Materials; (2) Manufacturing Equipment; (3) Manufacturing Operations; (4) Residuals; (5) Manufacturing Chemistry and Physics; (6) Storage; (7) Distribution Supplies and Materials; (8) Distribution Operations; (9) Chemistry and Physics (other than Manufacturing); (10) Gas-Engines; (11) Gas-Consuming Appliances, other than Engines; (12) New Business Methods; (13) Collections and Dealings with Consumers; (14) Accounting, other than Collections; (15) Management; (16) Legal Matters; (17) Literature; (18) Miscellaneous. This is really a very comprehensive list; and, if numbers are a fair basis of judgment, they are here indicative of the directions in gas-works' management and operation in which the minds of American gas engineers and managers are at the present chiefly concerned. The greatest number of questions—80 in all—is found in the section dealing with gas-consuming appliances (other than engines); then manufacturing chemistry and physics come next with 72 questions; distribution supplies and materials make a good third with 65; manufacturing operation, a fourth with 60; manufacturing equipment, a fifth with 50 questions; new business methods, a sixth with 43; gas-engines ranks seventh with 39; distribution operation eighth, with 32; residuals produced 29 questions; and chemistry and physics (other than manufacturing), 29. Some of the remainder run into very low figures. It is not at all surprising that gas-consuming appliances should head the list; and this is testimony to no shortcoming in the matter of the interest of the gas engineer and manager on the other side of the Atlantic, in the important matter of the best appliances for giving the consumer the greatest value for his money. And, on the other hand, it is of interest to see how high the scientific problems underlying the everyday work stand in attractiveness in the desire for solution.

Although gas-making materials bear with such immense importance on the financial and manufacturing results of a gas undertaking, one cannot help observing—not only in connection with the Question-Box, but generally—how little these materials are brought under collective consideration and discussion. Yet the experience gained, and the special investigation that proceeds in individual works, if it were amassed, would represent a vast store of valuable information. We can imagine the reader saying, What is there fresh to talk about in relation to gas-making materials? It is not suggested that something fresh crops up day by day; but if occasionally a new point does not jut out, if there are not variable experiences, if there is not information that is desired, if there are not matters upon which publicity rather than privacy would be advantageous, then what is the good of all the work and the changing experiences with the fundamental materials of gas-production? There is the question of oil, for example. Mr. William Newbigging raised the point recently, in his report to the Macclesfield Corporation on the relative advantages of carburetted water-gas plant and increased storage, as to the poorer result-producing quality of the oil now supplied for carburetting water-gas than was the experience aforetimes. Since Mr. Newbigging's report was issued, other engineers have stated that their experience has corroborated this—that the results from the oil now delivered to them are not those that they were able to obtain in times past. There we have a question that would be all the better for a little ventilation by those whose experience in this matter enables them to speak comparatively, and thus confirmatively or otherwise, of Mr. Newbigging's assertion.

In this new Question-Box volume, we find that gas-making materials come almost at the bottom of the list in point of numbers of questions and answers, though the honour of first place is properly given to it in the volume. But when the questions and answers are examined, it strikes the student that most of them would have found better classification under the heading of manufacturing operation. Take the very first question as an example. "Has anyone tried using about half-a-gallon or less of crude oil on the coal just before throwing in retort to increase the make? What results?" That is a question of manufacturing operation rather than of material. However, from the answers, it is found that one contributor has used kerosene in an emergency; and the increased hourly make was about 20 per cent. Another testifies that practice has proved that candle power may be built up very rapidly by using oil on the coal; but while the volume of gas produced is perceptibly more, it is not commensurate with the increased cost of material. In another case, where the holder was low, the make was increased about

15 per cent., with an addition of about 2 candles to the illuminating power. In this case, 10 gallons of oil were used, or 7 quarts per retort. But, from the several answers, judgment is formed that the proceeding is not economical, and should be avoided except in emergencies. An engineer is troubled at times, in using Texas crude oil, with an odour of sulphur, which oxide of iron will not remove. Several correspondents offer advice. The experience of one is that the employment of lime to the depth of 4 inches on the lower set of trays, and the use of oxide on top of it, will overcome the trouble. It is suggested by a second correspondent that the area of the purifying-boxes for the perfect purification of gas made from South Texas crude oil, which usually runs to close upon 2 per cent. of sulphur compounds, should be in the neighbourhood of 2 feet area for a single box per cubic foot of gas made per minute; and for safety, the gas should pass through two or more boxes. More washing and purification is the generally proffered remedy.

Still on Texas oil, comparisons are asked for between the gas oil and the crude oil varieties; and one reply mentions that experience has given satisfaction that economy in the use of the gas oil is not sufficient to warrant the difference in the cost between the two oils. Another contributor states that the crude variety affords slightly better candle-power results than the gas oil; but a little more trouble is experienced in the purifier-house. The question, "What would be the effect on the candle power and on fuel if water-gas tar were introduced in the top of the generator or carburettor of a water-gas set, using the tar either mixed with crude oil or unmixed?" has, among its contributors, the name of a gentleman who, during his all too short stay in this country, won the respect of every gas engineer with whom he had relations —Mr. J. Arnold Norcross. His answer to the interrogation is that the effect of using water-gas tar on top of the generator bed in quantity sufficient to make any impression on the production of gas is to lower the temperature of the fire, and produce blow-holes; thus interfering with the decomposition of the steam used for water-gas making. The effect of using water-gas tar, either mixed with gas oil or by itself, in the carburettor, is to plug up the chequer bricks with carbon, both solid and in the form of lampblack; and thus interfere with the efficient treatment of the gas oil used.

With this brief reference to the first section, we turn to the second one—"Manufacturing Equipment," to find, in the first place, that the steam-turbine, as in this country, has attracted attention and trial on the part of gas engineers. But, unlike the common experience in this country, they are not altogether well spoken of. The first reply to an inquiry for experience states flatly that the steam efficiency of the turbine does not as yet equal that of the reciprocating engine; but the advantages of first cost, easier installation, less room, cheaper foundations, smaller cost in maintenance, uniform efficiency, over a wide range of load, &c., are set forth. That the turbine is "too delicate" is the opinion of a correspondent with a year's experience. The expense of repairs came to $184 in that period, besides a similar amount not charged by the makers. Contrary are the views held by a correspondent who has had a 55-horse power steam-turbine in use driving, continuously during two years, a No. 2 Sturtevant blower. The repairs on the installation in his case have cost less than $50. If anything, in this instance, the turbine saves fuel. One answer as to the steam consumption is picked out. It is that in running turbines non-condensing with 100 lbs. boiler pressure, there are required from about 50 lbs. of steam per brake horse power in the 7-horse power size to about 38 lbs. of steam in the 75-horse power size. Running condensing, with 28 inches vacuum, about 21½ to 30 lbs. will be required.

An inquiry is made as to what advantage, if any, has a reverse steam 5-feet water-gas plant over a base steam type. The answer of one correspondent pretty correctly sums up the replies of the others. There are, he says, decided advantages, in making up-and-down runs in any size of water-gas plant—such as an increased make of gas, a saving in oil, coal, and labour, and better gas due to the more uniform condition of the generator fire. We cannot enter into the questions of the thickness of fire-brick linings in generators and superheaters; but we have an excuse here for pointing out that, in a compilation of this kind accidents will, of course, happen. Hence we find that one reply, under this question as to fire-brick linings, gives the correspondent's experience in the testing of meters. Coal gas is almost entirely neglected in this section; the greater number of questions being on the subject of water gas. We come across the inquiry as to whether it is an advantage for steam used in water-gas plant to be superheated, and find opinion is variable on the point. One man says that it is a benefit; another that he has found it is on one set, but not on another. A further correspondent cannot see any advantage in superheating; while a fourth thinks the advantage gained is more than offset by the extra cost of repairs and fuel. So that, on the whole, views are not favourable. Here, as in other questions, we see one respect in which the Question-Box is a failure from the standpoint of those desiring guidance. Admittedly it is valuable to get all sorts and conditions of experience; but unless the inquirer is to be guided by taking the majority view, he is just as much at sea as ever as to the course he should himself adopt.

A current topic is found in the inquiry as to what is the relative efficiency of power transmission by compressed gas and by electricity? And one of two interesting replies is that, in a general way, the transmission of power by means of compressed gas is much more economical than that effected by means of the electric current. The losses in the case of gas are merely those due to loss of pressure by friction, and other minor losses due to condensation. The latter item would scarcely be worth consideration in the case of illuminating gas, where the loss in illuminants would not affect the power to any great extent. In the case of condensation of water vapour, the loss would be more apparent than real. There is also a possibility of loss of efficiency by reason of leakage; but high-pressure lines are now laid that do not show 2 per cent. leakage, and that would be quite ordinary practice. In the case of transmission by the electric current, there is a loss of efficiency at the passage of the current through each apparatus used, either in the measurement, transmission, or transformation of the current.

A mass of correspondence was called forth by an inquiry as to whether the Pelouze and Audouin tar-extractor could not be done away with—using only washers and scrubbers, and thus taking off the back-pressure it gives. The opinions are not by any means uniform; and sample replies are these: (1) While the Pelouze and Audouin tar-extractor could be done away with, this would be by no means advisable. Tar is best removed by contact; and the back-pressure due to the extra washers and scrubbers necessarily required, would be as great or greater than that due to the extractor. With washers and scrubbers, the temperature of tar removal would be much lower (unless the washing water were heated), with the consequent disadvantage that the tar would be stiffer, and much more liable to clog the washers and scrubbers. With a greater amount of tar in the gas during the latter part of the scrubbing process, which would unavoidably result with this method, as efficient a removal of ammonia as with the present system would be impossible. (2) There is a good gas plant making 30 million cubic feet annually that does not use its tar-extractor, but has one primary air-condenser before the exhauster, and two scrubbers after the exhauster—one of the latter having only wooden balls in it, and the second having balls in the bottom tray, corncobs in the second tray, and "excelsior" in the two top trays. In the top of this scrubber is put 1 gallon of water per 1000 feet of gas made, to remove the ammonia, and not a particle of tar passes this scrubber.

An inquirer who seeks to find opinions on the point as to whether there is enough advantage in wrought-iron pipe over steel to justify the increased cost, elicits a variety of views; but the "ayes" are in the majority. Throughout a negative reply is given to the interrogation, Would a horizontal condenser be as efficient as the ordinary vertical condenser? Suction gas producers are affording in America, as here, topic for consideration. There is an inquiry on the subject, the nature of which will be gathered from the information given. The selling price of producer gas plants for engine purposes will be found to average about as follows: Pressure anthracite coal gas-producer plant, erected complete, not including freight and travelling, $25 per horse power. The same arranged for bituminous coal, $27 per horse power. These prices are for sizes in the neighbourhood of 300-horse power. Costs are distributed about as follows: 26 per cent. for the producer proper; 15 per cent. for scrubbers and purifiers; 30 per cent. for the gasholder; the balance for piping and general fittings. In the bituminous coal plant, the only increase in price will be found in the scrubber and purifier apparatus, which in this case will be 20 per cent., instead of 15 per cent. Roughly speaking, suction producer plants, both bituminous and anthracite, would cost about half the above; the reduction in cost being due firstly, to the fact that producers operating under suction have almost twice the capacity of those which operate under pressure, and, secondly, the cost of a holder is entirely eliminated. While these figures are fairly close, each installation should be considered separately, as local conditions and the fuel employed will have a considerable bearing upon the price of the outfit. Towards the end of this manufacturing equipment section, it is found that the generation of acetylene gas for use as an enricher for coal gas is not considered either economical or safe.

There are a large number of inquiries that are not of a first-rate order in the section; but the justification for their appearance is found in Mr. Doherty's remark in the preface: "The Question-Box is intended to help all members of the gas fraternity; and particularly those who do not enjoy the opportunity of attending many conventions each year."

(To be continued.)

Withernsea New Gas-Works.

In an early issue of the "JOURNAL" it is hoped to give some particulars as to these new works, which were started on the 1st ult., having been constructed for the Holderness Gas Company, Limited, under the direct control of Mr. J. Holliday, of Hull. Applications for the supply of gas are now coming in very rapidly; and by the end of the present year, it is anticipated that some 300 consumers will be connected to the mains. Already the public lamps (incandescent throughout—64 single and 12 double burner lights) are regularly lighted—much to the satisfaction of the inhabitants of the district. Mr. David Watson, late General Foreman of the Scarborough Gas-Works, has been appointed Manager; and matters, generally, look very healthy indeed for the future of the Company.

VERTICAL RETORTS FOR THE PRODUCTION OF ILLUMINATING GAS.

By William Young, of Peebles.

[Fourth Article.]

Although, as has been already explained, I was early in life led to leave the gas and become practically engaged in the shale-oil industry, yet during all the years over which the foregoing narrative extends, I have continued in various ways to take a deep interest in the gas industry—more particularly in the purely technical part of the manufacture; and I have found my inter-relation in this regard to be both advantageous and a source of much pleasure. It has enabled me, either alone or along with others, to utilize the observations and experiences gained in each of the industries to the advancement of both.

As an illustration in this regard, I may be allowed to briefly refer to an incident that through a series of inter-evolutionary processes has led up to my having as a colleague in my present subject Mr. Samuel Glover, of St. Helens.

Away back in the late sixties, through my late brother-in-law, Mr. Cusiter, being appointed by the North British Association of Gas Managers one of a Committee to find if possible a cheap substitute for water in wet meters, I was led to send him a sample of intermediate paraffin oil as appearing to me a likely fluid, as it would neither freeze nor evaporate. It was, however, found on trial to have for the purpose a worse fault than either—that it robbed the gas of its illuminants; and an experimental investigation showed that these absorbed illuminants consisted of the vapours of liquid hydrocarbon identical with the most volatile constituents of coal tar.

This observation suggested two things. The first was that the solvent power of the oil might be advantageously employed to absorb and recover as naphtha the vapours present in the 30 to 35 candle gases from the shale in oil-works which were being used as fuel. This discovery led me to the devising of a process by which millions of gallons of naphtha were profitably recovered from the shale gases, to the benefit of the shale-oil industry. The second thing suggested was that the liquefied illuminants present in coal tar were there owing to the heavier oily constituents present in the tars having absorbed them out of the gas during the process of condensation.

This suggestion led to my becoming associated with the late Mr. Henry Aitken, of Falkirk (who was largely interested in cannel coal mining, and had an experimental gas-works on a practical scale at Causewayhead, near Linlithgow), in the devising of a counter-current process of condensation—known as the Aitken and Young's analysis process—by which the absorbent power of the tars was largely counteracted, and the illuminants left in the gas to the benefit of the gas industry.

Then, again, in consequence of the same intermediate oil which it was proposed to use in wet meters becoming so unsaleable as to cause the shale-oil manufacturer to use it as fuel. In order to find a market for these oils, I was—along with Mr. Bell at the Peebles Gas-Works—led to devise what has come to be known as the Peeble oil-gas process, in which, in order to obtain a perfectly permanent oil gas, the solvent power of the oil (first observed in the wet meter) was again utilized to dissolve out of the oil gas the condensable vapours, and carry them back to the retorts to be further cracked-up into permanent gas.

As the readers of the "Journal" know, the introduction of the Peebles oil-gas process into the St. Helens works by Mr. Glover, as a substitute for the use of cannel, while it proved to be a most economical method of enrichment, yet brought about no end of trouble from naphthalene deposits owing to cheaper coals and higher heats being adopted; and this in turn led to the study of the naphthalene problem by Messrs. Samuel and Thomas Glover and the writer, and to the solution of the problem on sound, scientific principles, the origin of which were directly traceable through the train of evolution process, to the experiments with the intermediate oil in wet meters.

During the time the naphthalene problem was under consideration, I had many visits from the Messrs. Glover, and occasionally during these visits I was accompanied by them in my visits to the oil-works where I was advising as to the erection of vertical retorts, &c. The expeditious and economical manner in which the work is done in the shale carbonizing works was readily appreciated and contrasted with the work in the ordinary gas-works retort-house; and the problem of carbonizing coals in similar vertical retorting arrangements was occasionally discussed. Latterly, Mr. Samuel Glover—in view of his having at an early date to make extensions of his carbonizing plant—induced me to join him in studying and working out on sound, scientific principles the carbonizing of coal for the production of illuminating gas in vertical retorting arrangements.

Before passing on to describe the outcome of these studies, it is almost necessary that I should refer to papers which I had the honour of bringing before the West of Scotland and North British Associations of Gas Managers that have a direct bearing upon the subject.

At the meeting of the West of Scotland Association held at Musselburgh held in 1874, in the discussion that followed the reading of Mr. Scott's paper on the vertical retorts then in use there (and previously referred to), it was pointed out that the cracking-up or gasifying of the volatile products from the coal, by passing them through a mass of incandescent coke—as was the case in that retort, and in that of the Malam process in use at Dumfries, which had also been brought under the notice of the Association—had an injurious effect, in that while a very large volume of gas was produced, it was found to be of only poor quality.

At the meeting of the same Association at Kilmarnock in 1878, I had the honour to read a paper consisting of "Notes on Some of the Physico-Chemical Laws relating to Gas Manufacture," in which (along with other matters) attention was directed to the valuable function performed by the vacant space over the coal in the retorts in cracking-up and gasifying the evolved hydrocarbon vapours—that, as was well known, when so cracked up, the vapours from the coal yielded gas of superior quality. The writer explained that from a study of the laws relating to the action of heat in the cracking-up of hydrocarbon vapours, he had come to believe that these different results were due to the manner in which the heat was made to act upon the molecules in the vapours; that when the vapours were made to come into contact with highly-heated surfaces, in passing though the incandescent coke, the molecules were decomposed indiscriminately and to an excessive degree; and that while the volume of gas produced might be larger, the gross illuminating value was less, owing to the excessive disassociation of the carbon upon the heated surfaces.

I pointed out, on the other hand, that when the vapours from the coal were acted upon in the empty space over the coals in the retorts, they were largely cracked up by the radiant heat; and that, under such conditions, the heat and the molecules in the vapours had what might be described as a selecting action for each other—that the more complex molecules in the vapours from the coal absorbed the radiant heat the most powerfully, and were in consequence gasified to a greater extent. The simple molecules in the vapours and gases absorbing proportionately less heat, were, however, thus prevented from being over-decomposed; and, more carbon being left in combination in the gas, it had in consequence a higher illuminating power.

I had also the pleasure of bringing the same subject before the North British Association of Gas Managers, at their meeting in Perth in 1880, in a paper I read upon "Jottings on the Principles involved in Gas Manufacture." After referring to the above paper to the West of Scotland Association—as to the valuable function performed by the free space over the coal—I remarked: "At the present moment, we have many evidences of the correctness of the principles of distilling with a considerable free space in the retorts. We all know the advantages of working light charges, and of having the coal regularly distributed in a layer, so as to have the free space, and the coal in as regular a layer as possible. We have further evidence also in the fact that every mode of carbonizing coal where the retorts are completely filled, so as to leave no free space, or where the decomposition of the volatile constituents of the coal is effected with incandescent solid matters, has been abandoned."

Again at the meeting of the same Association at Dundee in 1893, in a paper I read on "The Principles of Producing Gas from Liquid Hydrocarbon," reference was made to these previous communications, and in support of the views therein expressed, there was described a further development of the principle of cracking-up and gasifying oil and tar vapours, by the action of radiant heat in a large empty retort, by what has come to be known as the Peebles process.

One of the difficulties experienced in cracking-up the oil or tar vapours by radiant heat in empty space was that the carbon unavoidably set free during the gasifying process was in a very flocculent state, and was carried forward in the current of gasified products, and was liable to choke up the stand-pipes and other parts of the condensing plant. This was more particularly the case when cracking-up very heavy oils and coal-tar vapours. To counteract this difficulty, the oils and tars to be gasified were fed into the stand-pipe, and were thus—on the counter-current principle—made to entangle the sooty flocculent carbon, and also partially condense the ungasified vapours, and carry them back into the retorts. At the same time the oils or tars were themselves heated, ready to be volatilized and gasified on entering the retorts. The practical results from this process demonstrated that a larger yield of enriching and illuminating gas was produced from a given quantity of oils or tars by decomposing or gasifying their vapours by means of radiant heat than by any other practicable means.

If the views expressed in these papers be sound, it follows that, in order to successfully and economically carbonize coal for the production of illuminating gas, the volatile matters should be destructively distilled out of the coal under such conditions that they have to come in contact with the smallest possible area of highly-heated surfaces, but that subsequent to their elimination from the coal the evolved vapours should be cracked-up and

gasified in an otherwise empty space, by the action of radiant heat from surfaces heated to a suitable temperature.

There has recently been brought under the notice of the gas industry a system of carbonizing coal in vertical retorts for the production of illuminating gas, devised by Dr. J. Bueb, and in operation at Dessau and Mariendorf. The chief merit claimed for this system is that the retorts are completely filled with coal; that the coal is carbonized, and the volatile constituents decomposed and gasified by heat of very high temperature being applied to the walls of the retorts, and directly conducted to the coal; and that there is no free space in which the evolved vapours can be acted upon by radiant heat.

Possibly the readiest way to convey a conception of what appears to me as the conditions that should obtain to enable the coal to be economically carbonized, will be to begin by a consideration of the conditions obtaining in the Dessau retorting system and the results said to be got therefrom.

In the description of the Dessau retorts by Dr. J. Bueb, which appeared in the "JOURNAL" for Sept. 26 last, we are told that—

> The course of carbonization, after the vertical retort is charged, is as follows: The coal lies at first tightly pressed from above against the strongly heated walls of the retort. An intensified carbonization ensues on the outermost layer of coal, which causes the coke, in consequence of the compression which it suffers through the weight of coal and the swelling, to acquire a very close consistency. Thus this coke becomes much less permeable to gas than the still uncarbonized layer of coal towards the middle of the retort. The gas evolved on carbonization will seek the way of least resistance; and so passes into the middle of the retort. The following is a tabular statement of the temperature as measured in the innermost core of the retort:—

Time after Charging.	Deg. C.	Time after Charging.	Deg. C.
½ hour	90	5 hours	440
¾ ,,	105	6 ,,	470
1 ,,	145	7 ,,	500
2 ,,	200	8 ,,	580
3 ,,	280	9 ,,	620
4 ,,	370		

> It is plain from this that a relatively cold core of coal continues to exist in the interior of the retort nearly up to the end of carbonization, and that this core serves at the same time as an exit passage for the gas and tar evolved by the carbonization of the coal. The carbonization and gasification of the coal proceed perfectly concentrically. The evolved gases and tarry vapours are forced into the interior of the charge, and rise in the core of the coal. The rate of flow of the gas in the retort is therefore relatively very high, because there are no free spaces within the vertical retort as there are in the horizontal or inclined retort. There are only the spaces intervening between the pieces of coal left available for the passage of the gas. In my estimation, the gas made in the vertical retort remains there only one-fifth part of the time that it is detained in the horizontal retort. Consequently, the gas leaves the vertical retort at a relatively low temperature. The following tabular statement shows the temperature of the gas as it escapes from the retort at each hour throughout the period of carbonization.

Time after Charging.	Deg. C.	Time after Charging.	Deg. C.
1 hour	190	6 hours	215
2 ,,	310	7 ,,	213
3 ,,	315	8 ,,	210
4 ,,	318	9 ,,	205
5 ,,	217	10 ,,	188

> Thus, while a temperature of 1300° to 1400° C. prevails in the setting, the escaping gases are heated at the most to slightly above 300° C.

There can be little doubt that this graphic description by Dr. Bueb of the action of the heat applied to the carbonizing of most kinds of coking coal is sound; and I cordially agree with all he says in this regard. But I am at issue with him in his deduction, that these are the best conditions for the gasification of the volatile matter present in the coal.

The outermost layer of coal resting against the intensely heated walls of the retorts will, as Dr. Bueb describes, undergo an intensified carbonization; and for a brief period the volatile constituents in that layer will be over-decomposed, and there will be produced an extremely large volume of gas per unit weight of coal, possibly at the rate of 1300 to 1400 cubic feet or more per ton. But, in consequence of the intensified decomposition, it will be largely composed of free hydrogen; and I have no doubt that the coke formed by this intensified carbonization will be very dense owing to the deposition of the carbon from the volatile matter within its pores, and that the gas and products evolved from the still uncarbonized layers will, as they are evolved, be driven inwards and upwards through the interstices of the cooler coal forming the centre of the charge, till all is ultimately carbonized.

I have to point out, however, that while the outermost layer of coal will be over-carbonized, owing to its being subjected to the extremely high temperature (1300° to 1400° C.) of the walls of the retorts, the innermost core of coal in the retorts must—as shown by Dr. Bueb's own figures as to temperatures—be just as much under-decomposed. It will be observed that it is four hours after charging before the innermost core of coal is heated to the temperature of 370° C. (the lowest temperature at which coal begins to decompose), and that for the next three hours it is being carbonized or decomposed under temperatures of from 440° to 500° C.—conditions more suited for the production of crude paraffin oil than for gas; and for the remainder of the time the temperature (500° to 620° C.) is still far too low for the gasification of the volatile matter in the coal.

Such being the case, it will be evident that as the carbonization of the coal proceeds perfectly concentrically, each successive layer of the charge will be carbonized at gradually reduced temperatures, as the heat has to be transmitted through the thicker layer of coke, until the layer of coal next to the core will be carbonized or distilled under conditions approaching that of the core itself, which, as explained, is more appropriate for the production of liquid products than for illuminating gas. And, further, seeing that the volatile products after being evolved from the coal are not subsequently exposed to a temperature so high as that by which they had been evolved from the coal, they must necessarily pass from the retort to a large extent not perfectly gasified.

The resulting products fully support these deductions. The yields of ammonia and of tar are, as might be expected, both somewhat higher than with horizontal retorts. The tar has an entirely different composition from that obtained from the same class of coal in ordinary retorts—appearing as a thin brown oil containing only 2 to 4 per cent. of free carbon, whereas ordinary coal tar contains upwards of 20 per cent. The specific gravity of the tar from the vertical retorts is 1·1, as compared with 1·2 for ordinary tar, and yielding on distillation fractions at the different boiling points that would indicate that the tar is composed of mixed high and low temperature carbonization products.

These views are still further supported by the fractional distillation analysis of the tar, and the chemical analysis of the gas, as given in the article headed "The Vertical Retort Trials at the Mariendorf (Imperial Continental Gas Association) Works," which appeared in the "JOURNAL" for Feb. 6. The former indicates that a considerable proportion of the volatile matters evolved from the coal have passed out of the retort without being gasified, and the latter that the gas has been produced at two extremes of temperature, as indicated by the excessive percentage of free hydrogen and the very low percentage of methane compared with those contained in ordinary coal gas, as also the relative heating and illuminating power of the gases.

Under such carbonizing conditions, it will be easily understood that naphthalene could only be present in the gas in very small quantities, as it would only be during the carbonization of the outermost layers of the coal that naphthalene would be produced; but that a very large percentage would be produced during the high-temperature intensified carbonizing period, there can be no doubt. The oily products produced from the inner and remainder of the charge carbonized at a lower temperature would, however, act as excellent solvents to take up what naphthalene was produced in solution.

Similar remarks may be made regarding the ascension, or rather horizontal, off-take pipes. Such a quantity of low temperature oily products would naturally keep them from choking.

If the vapours that condensed to form the thin brown oil, instead of being allowed to pass away by the outlet to the collecting main, had been subjected to conditions the same as those obtaining in the Peebles process—that is, exposed to the action of radiant heat of appropriate temperature, they would have been cracked-up into gases having a very high enriching value.

This could be readily accomplished by adding to the top of the Dessau retort a further section, and providing means for heating it to a suitable temperature (which would require to be considerably lower than that applied to the bottom portion of the retort). By this means, there would be selective cracking-up of the volatilized products. Those that had already been subjected to a high temperature in the lower section of the retort would stand the action of the radiant heat without being further decomposed; while the oily vapours that had been distilled out of the coal at lower temperatures would be selectively acted upon by the radiant heat, and cracked-up into permanent gases and vapours of high illuminating power.

The temperature of the heat required for this purpose is not so high as to decompose the ammonia gas or produce cyanogen while diffused through the hydrogenized gases.

It is true that this process of cracking-up the oil or tar vapour by the action of radiant heat would necessarily set free a considerable quantity of flocculent sooty carbon that would give trouble by blocking the stand or outlet pipes, and this condition of matters might be further aggravated by the possibly higher temperature of the effluent vapours and gases, and by the character of the residual tar vapours.

This condition of matters we propose to remedy by arranging that the sooty tarry hot gases leaving the top of the radiant heat section of the retort, shall pass on their way to the exit pipe to the collecting main, up through and among the coal (contained in the hopper) to form the next charge—in a manner similar to that described in the distillation of shale by the Young and Beilby process. The more easily condensed tar will therein be deposited upon the surface of the coal, and the sooty flocculent carbon thereby filtered out; and the gas will pass to the outlet pipe clean, and only accompanied by the more volatile and liquid portion of the tar vapours. At the same time, the heat of the gases and products are economically and usefully employed on the counter-current principle to heat the fresh charge of coal,

and to carry back into the retorts the denser tar and sooty matters, and to fit the coal for more effective carbonization.

With some coals, and under certain conditions to be afterwards explained, it may be an advantage to also apply a portion of the products of combustion coming from the upper section of the retorts to the external heating of these hoppers in the manner described in the improved Young and Fyfe retorts.

(To be continued.)

VERTICAL RETORT SETTINGS.

By Herr E. KÖRTING, of Berlin.

[Abstract Translation of a Paper read before the Brandenburg Association of Gas and Water Engineers, Berlin, March 11.]

The author is in the fortunate position, in presenting a paper on vertical retorts, of having had a recent opportunity of seeing the Woodall-Duckham settings at work; so that his remarks will not be confined to his own experiences with the Bueb settings. Messrs. Woodall and Duckham have willingly given him permission to publish a description of their setting; but he has to refrain from divulging the working results. Mr. Harold Woodall is the son of Mr. Corbet Woodall, and is Manager of the gas and water works at Bournemouth and Poole, where Mr. Duckham is his Assistant. Both are young men, energetic, and practical to the finger-tips, yet imbued with the healthy optimism which is so essential to success. It is not surprising that they have tackled the oldest and most difficult problem in the gas industry—viz., the continuous operating of retorts.

THE WOODALL-DUCKHAM RETORT.

The trial setting at Bournemouth comprises four retorts, 6 metres (say, 20 feet) in length, disposed in plan as a square, and very much widening out in the downward direction. Every pair of retorts is kept charged with coal by a simple yet practical charging arrangement. A funnel containing coal, and with a small bottom mouth, has beneath it a cylindrical chamber, which communicates, by means of an inclined down-pipe, both to the left and the right, with the top mouthpieces of two retorts. The cylindrical chamber is completely filled by a drum, which is provided with a sector-shaped cutter, and is rotated slowly on its axis. As soon as the cutter coincides with the mouth of the funnel, it fills up with coal, which it discharges through the inclined fall-pipes into the retorts—providing always that there is room for it there. If this is not the case, the coal remains untouched in the drum, and makes a second rotation. In this manner the feed of coal accommodates itself exactly to requirements; and forcing of coal into the retort, which may readily cause bulging of the heated fire-brick, is wholly avoided. The lower mouthpiece is common to all four retorts, and terminates in an oblong slit which dips into water and ends below on an uprising conveying band. The process is as follows.

The coal passes slowly and continuously into the upper mouthpiece of the retort, and is carbonized as it gradually traverses the whole length of the retort. The coke is quenched in the water vessel of the lower mouthpiece, and is quite gradually conveyed out of the water by the conveying band, and discharged into a receptacle. Steam is at the same time produced, and rises through the red-hot coke in the lower zone of the retort, where it is converted into water gas, which passes forward with the coal gas produced in the upper part of the retort. In this manner, it becomes possible to produce far more gas per retort and per ton of coal than by any other system known; and the whole process makes a very striking impression on the observer. The difficulties are only revealed by closer study. The coke is of good quality, but naturally quite saturated with water, and not saleable in this condition. The conveying band does not always take up the coke uniformly from all four retorts. At times it slides down better in one than in another; and naturally uniform carbonization then becomes doubtful. In order to avoid these two faults, each retort in future must be equipped with a separate small mechanical drawing arrangement. The coke will fall into water as hitherto, but must be removed from it as quickly as possible by a rapidly running conveying band; so that it will not have time to become completely saturated. A further difficulty consists in the control of the water-gas production.

When all the steam which can be produced by the quenching of the red-hot coke passes into the retort, more water gas is formed than can be utilized. Messrs. Woodall and Duckham have succeeded in avoiding this fault in a simple manner. They keep the quenching water always at a low temperature, but thereby naturally lose the greater part of the heat which the hot coke possesses. It is further clear that the lower part of the retort, in which the production of water gas is proceeding, will never become coated with scurf. As soon therefore as the unavoidable cracks appear in the retort, it becomes unsound, and lets gas pass out into the furnace on the slightest positive pressure within. It is compulsory therefore always to work with a vacuum; and account must be taken then of some furnace gas being sucked into the retort. A further natural consequence is that, at Bournemouth, the hydraulic main, which has become superfluous, is given up; and the ascension pipe is there provided with a valve for closing it, and is allowed to discharge directly into the foul-gas main. This renders it possible, by increasing or diminishing the suction, to make more or less water gas. But the maximum degree of suction, and therewith the water-gas production, are limited by the soundness of the retort. The more furnace gas that finds its way in, the more must the vacuum be reduced. It is conceivable that, with retorts which have become very bad, water-gas production would have to be given up.

The heating of the setting is very simple and effective. The combustion occurs at the top. The heat is distributed naturally quite evenly among the retorts, and also passes downwards uniformly. Artificial guidance by flue-passages is quite unnecessary. The setting is very hot at the top; but even at the bottom it has quite a high temperature, which has probably been found requisite for the production of the water gas. Out of regard for economy, no importance has so far been attached to perfecting the regeneration of heat. Hence it cannot yet be established how much fuel the Woodall setting will consume for heating.

The chief question which we have to consider in forming an opinion of the type of setting is, however, whether the chemical composition of the mixed gas produced will be favourably affected by the continuous working of Messrs. Woodall and Duckham, and their novel departure in the art of carbonization? What takes place in the retort? Water gas is produced in the lower hot layer of coke; and this water gas assists the coal gas formed above to get away quickly. But this also is probably its only use. Hydrogen, when once formed, can no longer interfere in the chemical process of carbonization.

The coal gas produced in vertical retorts by itself possesses a high calorific power, as is known from the results with the Bueb setting. In the upper part of the retort, the half-carbonized cakes of coal slide continually from a narrower to a wider cross section. Probably cavities are thus constantly formed by the hot walls of the retort, and the gas flows through them. That such is the case is confirmed by the extremely small loss of pressure with which the gas traverses the 6 metre (say, 20 feet) deep column of coke and coal. If it is borne in mind that the setting is hottest at the top, it can scarcely be represented that the conditions are peculiarly favourable for the formation of heavy hydrocarbons. It is well known that ammonia is very unstable in heat, and the amount of ammonia in the resultant gas is therefore a criterion of the temperatures to which it has been exposed in the retort. When it is found that the Bueb gas contains some 50 per cent. more ammonia than ordinary coal gas, whereas the Woodall-Duckham gas does not, it may be concluded that the Bueb gas leaves the retort on the average at a lower temperature. If this is the case, no special surprise need be expected in the quality of the gas made by the continuous process. The working results do not yet admit of any definite conclusion being drawn in this direction, as the coal (Acton Hall) which is being carbonized at Bournemouth is decidedly superior, in respect of the quantity and quality of the gas made, to ordinary Durham coal.

What has so far been achieved at Bournemouth may be summarized as follows:—

1.—Messrs. Woodall and Duckham have demonstrated for the first time, by, the author believes, eight months' uninterrupted working, that continuous operating of gas-retorts is feasible. He thinks they have thereby (putting aside anything further achieved) merited the recognition of the whole gas world.
2.—The Woodall-Duckham process proceeds automatically in closed vessels. A retort-house with Woodall-Duckham settings is therefore quite free from dust and steam, and can be kept as clean as an engine-room. This is of importance for gas-works in large towns, watering-places, &c.
3.—It will enable the stokers to be replaced in future in the retort-house by a few engine men.
4.—It will probably not be possible to make much water gas in the Woodall-Duckham settings, when ordinary gas coal is being used, unless the calorific value of the mixed gas made is to be lower than that which now prevails.
5.—If nevertheless it is desired for any reason to make a lot of water gas in a vertical retort, there is still wanting the heat-balance of the completely equipped setting for proof that it is cheaper to make water gas in gas-retorts than in a water-gas generator.

Before passing on to speak of the Bueb setting, the author would point out that Mr. Woodall is building a new gas-works at Poole, which displays his progressive ideas as much as the vertical retort. A visitor to the works would find himself well repaid for his trouble.

THE BUEB RETORT.

Turning to the Bueb retort, the construction of the settings at work at Dessau is well known. They comprise ten retorts 4 metres (say, 13 feet) in length. It is also known that they afford a high make of gas per ton of coal and per retort; that the gas is of high value, and poor in naphthalene; that the coke is large and hard; that the tar is freely fluid; and that 50 per cent. more ammonia is produced than in horizontal retorts. All these advantages have been substantiated by continuous working. The settings have now been nine months at work, and have proved satisfactory throughout. The author had set himself to investigate whether a setting of twelve retorts, each 5 metres (say, 16 ft. 5 in.) in length, would not give as favourable results. When

the Mariendorf setting was put into operation in July last, it was found that the upper parts of the retorts were not adequately heated. A small amount of reconstruction was necessary. The setting has been at work again since the beginning of November, and has given quite satisfactory results. Westphalian coal has been used in the trials, because it has been found to vary least in quality. It is commonly recognized that this coal is not particularly rich in volatile matter.

A special experimental gas-works was erected in connection with the trial setting, for a productive capacity of 210,000 cubic feet per diem. The gas was purified, passed through a meter, and tested in a special laboratory built for the purpose. A small gasholder on the works was filled at a uniform rate throughout the whole of the twenty-four hours, in order to secure an average sample of the gas for examination. The settings were tried at various temperatures. At high heats, much gas and little tar were produced; at somewhat lower heats, less gas and more tar. The injection of steam in the lower mouthpiece was also the subject of experiment. It was found thereby that the scurf on the walls of the retort was thus gradually completely consumed. As soon as this had happened, the retorts became unsound, and loss of gas occurred. It therefore became necessary in turn to inject steam for a few days, until the scab of scurf had been destroyed, and then for the next few days to work without steam until a new coating of scurf had been formed. In this way, it became possible to avoid entirely the harmful destruction of the whole of the scurf. Experiments are still being made to determine what is the most advantageous mode of applying the steam. It may appear best to use no steam at the commencement of carbonization, but to apply it only in the later stages; or it may prove, on the other hand, that small quantities of steam should be admitted uninterruptedly and uniformly to the retort. The latter plan would have the advantage that it would be unnecessary to look after the turning on and off of the steam. At Mariendorf, this method is being provisionally employed. Probably the amount of steam admitted in a given time can be so regulated that the coating of scurf shall never completely disappear, nor ever increase in thickness; and thus permanent conditions would be attained.

The following are the average working results obtained in the month of February:—

Gas made per retort and day	15,890	cubic feet
,, ,, setting	190,600	,,
,, ,, ton of coal	12,380	,,

This yield of ammonia compares with an average for the year of 0·224 per cent. with the inclined-retort settings at Mariendorf. The gross calorific power averaged 576½ B.T.U. per cubic foot. The amount of coke used for heating the setting is for the present high—viz., over 16 per cent. of the weight of coal carbonized. Heat is utilized to the last degree by regeneration, however, and there is considerable fall of temperature in the setting. The only possible source of loss is therefore by radiation; and this will be appreciably reduced when several settings are united in one bench, and when the better insulation of the outer walls (which is contemplated) has been effected. A more normal consumption of furnace fuel may then be confidently anticipated.

The advantages of the vertical-retort setting may again all be summarized as follows:—

1.—High make of gas with a minimum area of land for the retort-house.
2.—High make of gas per ton of coal, without any falling-off of quality.
3.—High make of gas per retort per diem.
4.—The gas is very poor in naphthalene—almost free from it.
5.—The gas contains 50 per cent. more ammonia.
6.—The tar is quite thin, and is rich in valuable oils.
7.—There are no more stoppages of ascension pipes and hydraulic main.
8.—No more burning-off of scurf from the retorts will be required.
9.—The work in the retort-house is quite considerably diminished as compared with inclined-retort settings, and is limited to a little manipulation. The retorts require charging only every ten or twelve hours.
10.—The coke is particularly large and hard, even from coal (such as Saar coal) which, under other conditions, would be of little value in this respect.

This is, the author thinks, an imposing list of advantages; and it must be conceded that these results arouse expectations of complete success of the Bueb setting. At the same time, however, utterances are spreading in England and Germany which declare that Dr. Bueb's invention is but a bad imitation of earlier patents, and completely deny that it can be covered by a patent. What is then the essence of a technical invention? The author believes that this can be best realized by a comparison with the making of poetry. With the great poet, the idea of a grand poem comes like a flash from the unknown, and in the next ten minutes will have taken the form in which it will charm for thousands of years. This idea may have for mankind far greater value than any technical invention. Similarly any child may have the idea of setting a retort vertically, and any mediocrity in technics can take out a patent for it. But in order to impart vitality to such a technical idea, a long and bitter strife with natural laws must be waged. Pluck is required to take, in the first instance, the responsibility for the hundreds of thousands which the experiments will cost. This alone is not a trifling matter. And then for every step forward, two steps backward are taken. An overpowering optimism which is not to be deterred by difficulties is required, as well as a vigorous self-criticism which will check all results again and again. And all this sufficeth not without the scientific training which teaches correct observation and the deduction of correct conclusions from observations. Then, when after days or years a construction has been attained which achieves something new and previously unaccomplished, the author would designate the great work involved therein as an invention, and would pronounce it patentable entirely irrespective of whether thousands may have earlier applied their teeth to this nut to no purpose.

It is naturally not always easy to describe such an inventive work in words which will constitute a patent claim. But the German Patent Office has fully accepted Dr. Bueb's work as an invention; and people have busied themselves in finding the proper construction to be put upon the patent claim. If the inventor has achieved a great work, it is also fair that the material reward should not be withheld from him. The author adheres to this view, in opposition to the stand taken by a large municipal body. The gentlemen of that body say: "The Bueb invention is not patentable. Let us have the construction, while you renounce all your rights; otherwise our lawyers will go to work and get the patent annulled for you." Now, if the patent is not upheld legally, it must go. You may, however, rest assured that it will be defended with all our energy. When, however, one large Town Authority conceive it to be their task to deprive inventors of the reward of their work, it seems to the author that they stand in a highly debateable position. The Empire grants protection for the property which the inventor acquires by the exercise of his talents. The Municipality endeavours as far as possible to deprive him of his reward, in order to gain a small pecuniary advantage, with regard to the violent injury which it inflicts, through this narrow-minded fiscal standpoint, on the progressive inventive spirit.

It must not be supposed that the author is speaking only on personal grounds. He has personally no profit to gain from the new setting. The two large Companies through whose active support the numerous experiments and the final result have been made possible, have sacrificed large sums of money, and naturally attach a certain value to recouping themselves by profit from licences. But the financial aspect of the question in only subsidiary with them. The main thing is that the vertical retort forms a new and powerful weapon for them in the struggle for existence (which is daily becoming more strenuous), against falling prices for gas, increasing prices for coal, and the constantly growing demands of communities and workmen. Should the management of the Imperial Continental Gas Association, for instance, come to the conclusion that the Woodall-Duckham retort-setting presents greater advantages than the Bueb setting, the author thinks they would not hesitate to decide for the former, and to write off, "as dissipated in smoke," the sums granted for the experiments.

In any case, the author wishes, in conclusion, to take this opportunity to express his sincerest thanks to the management of the German Continental Gas Company and the Board of the Imperial Continental Gas Association for the large sums which they have put at disposal for experiments, of which no one could predict with certainty the result. All will, he believes, agree with him that such liberality is destined to advance the gas industry as a whole, and merits imitation in the highest measure.

Discussion.

The PRESIDENT (Herr Nolte, of Berlin) called for discussion of Herr Körting's interesting paper.

Herr PFUDEL (Charlottenburg) inquired whether the charging arrangement of the Woodall-Duckham setting answered with all kinds of coal, and especially for dusty and wet coal.

Herr KÖRTING replied that hitherto only one description of coal had been carbonized at Bournemouth, and that was one extremely suitable for the purpose. It was a quite dry granular coal, which was ideal for mechanical appliances. So far as he knew, ordinary Durham coal had not been used; and it was quite possible that trouble would occur with small quantities of wet coal. But there was no experience on this point.

Herr TASCH (Lichtenberg) said he had gathered that it was unnecessary to burn off scurf with vertical retorts, so far as the Bueb system was concerned; but he was uncertain whether the observation applied also to the Woodall-Duckham retort. If the scurf had to be removed, could it be done while the retorts were in action?

Herr KÖRTING replied that, when steam was admitted to the Bueb retort, it was unnecessary to burn off scurf—at least, they had not burnt off any retort scurf for twelve to fourteen weeks. In the Woodall-Duckham setting, scurf was formed in the upper part of the retort, where coal gas was made; and in order to drive it off, the charge was allowed to sink half-way down the retort, by ceasing to charge fresh coal into it, and the scurf was then chiselled off with iron bars. Patching the cracks cannot, however, be carried out. It is necessary to wait until the coating of scurf has formed again. The fact is not, however, of much importance, as, owing to the small loss of pressure which continuous working entails, it is sufficient to have a vacuum of only

about ¼-inch. Considerable quantities of gas cannot therefore be drawn in.

Herr RIEMANN (Rixdorf) inquired whether, as several changes were being made in the Woodall-Duckham setting, he was right in assuming that it was not yet quite fit for practical use, and consequently was not ready for introduction.

Herr KÖRTING replied that certainly some alterations were contemplated—among others a better arrangement for discharging the retorts from below. He also mentioned that the regeneration of heat was not yet fully worked out. For the time there is only a kind of cooling ring; in the middle the secondary air passes to the top, and on the outside the hot gases pass concentrically downwards. All this has to be elaborated until a construction is arrived at which can be put upon the market. The setting in its present form is not ready for the market.

Herr PFUDEL asked whether the great heat of the Bueb settings did not conduce to changes of shape of the retorts similar to those which occurred with horizontal and inclined retorts. Also how the illuminating power of the gas from vertical retorts compared with that of the gas from other retorts.

Herr KÖRTING said, in answer, that the Chemists at Dessau had made exhaustive tests of illuminating power, and had found that, using the "London" argand burner, 5 cubic feet of the Dessau gas gave a light of about 15 candles; while on the average only 13·6 candles was obtained from the horizontal retort-settings. This agrees with the fact recorded by Herr Bueb that, when the vertical retorts have been in action, three-fourths of the benzol required to raise the gas to the tolerably high prescribed illuminating power has been saved. It is thus known that the gas from the 4 metre (say, 13 feet) high vertical retorts has a greater illuminating power than the gas from horizontal retorts; but the speaker said he could not yet make the same statement in regard to the 5 metre (say, 16 ft. 6 in.) vertical retorts. The experimental holder used in connection with the latter has a capacity of about 210 cubic feet, and stands in the open, exposed to wind and weather. The holder is filled by allowing the confining liquid to run away—a method which gives uniformity in the filling. But, as a result, there is always fresh water in the holder; and a portion of the heavy hydrocarbons is taken up by it. The photometer is in a cold room at a considerable distance from the holder; and the connecting service is not laid deeply. It is likely that a portion of the heavy hydrocarbons is thus condensed. It has, as a fact, been ascertained that there are 25 per cent. more heavy hydrocarbons directly after the retort than at the photometer. Thus it has not been possible to prove a high illuminating power with the 5-metre retorts—indeed, a lower illuminating power has been obtained. The speaker, however, attached little importance to the question of illuminating power for German conditions; and no experiments have so far been made with a view to obtaining an increase of illuminating power by warming or jacketing the holder. He added that the question of the strength of the retorts might be answered by the Superintendent, Herr Pohmer, who would narrate his experiences.

Herr POHMER (Mariendorf) said that he had given attention to the question of the durabiiity of the Bueb retorts. Being pessimistic by nature, he had at the outset mistrusted them; but the results of the past year had proved his mistrust to be unfounded. What, he asked, has the setting been able to withstand? It has, indeed, been misused. In June of last year, when it was first put in action, it was prepared for an output of 247,000 cubic feet per diem. The temperature, however, was so high that it was feared that there would be some fusion of the fire-brick. Two cracks appeared, which had to be patched; and this gave a favourable opportunity of trying how repairs might best be effected. It was found that the retorts could be easily and more cheaply repaired than with other settings. Damaged parts were simply cut out and built up with fire-brick. Normal heats have since been maintained, and no more deformation has appeared. The Dessau retorts have been longer at work than those at Mariendorf; but the charges still glide out as nicely as on the first day.

Dr. LANG (Gotha) referred to the quality of the coal employed, and the endeavours which had been made in recent years to produce coke as nearly free from ash as might be. As the Woodall-Duckham process also made water gas from the coal, the amount of ash in the coke would be quite appreciably increased. On the other hand, the Bueb coke was hard and large, and at least equal to other coke in respect of freedom from ash.

Herr KÖRTING said he only knew that the coal used in the Woodall-Duckham retorts was superior to ordinary gas coal. He had not seen analyses of it. As to the coke produced by these retorts, he was astonished to find that it was not bad—he had seen some large lumps—though inferior to the Bueb coke. He had not seen analyses showing the proportion of ash in the coke.

Herr SARTORIUS (Wittenberg) asked what happened if the coal or coke conveyors failed with the Woodall-Duckham retort.

Herr KÖRTING said that the setting must undoubtedly be brought to a standstill. But at the present day such dependence was placed in machinery that this risk would be run if the process presented a great advantage in other respects. The risk must, of course, be set off against the advantages. Till the working figures had been published, and it was known definitely as to whether there was a large gain in the process, it would be necessary to wait before deciding whether to prefer a simple construction like the Bueb setting, or a more complicated one like the Woodall-Duckham.

Dr. BUEB (Dessau) said they were extremely grateful to the Board of the Imperial Continental Gas Association for giving a technical man of Herr Körting's high standing the opportunity of testing the Woodall-Duckham system in practice in England, and reporting on it on this occasion. There appeared to be no doubt, from the report, that the process had not yet been so far perfected that it would be possible to pass to large-scale working with it. The causes of the previous failures of the Woodall-Duckham process, in the speaker's view, consist in the inventors having attempted too large and comprehensive a task. They would solve at once four of the most difficult problems in the gas industry—viz., (1) Continuous feeding of coal into the retort. (2) Carbonization in vertical retorts simultaneously with continuous working. (3) Continuous withdrawal of the coke made. (4) Utilization of the heat of the red-hot coke for water-gas production. All these four problems were, apart from the rest, extremely difficult of solution. In four years of assiduous work devoted to solving only one problem, the speaker has realized what a task has to be mastered. Of the four problems of the Woodall-Duckham process, only one, he said, can be regarded as solved at the present time—continuous working—so far as can be gathered from Herr Körting's report. The second—continuous carbonization in vertical retorts—cannot be considered as being solved, as cracks that appeared in the retorts allowed the passage of furnace gases, owing to the setting having to be worked with a vacuum in the retorts. This difficulty occurs even with the use of a kind of coal which gives as good as no loss of pressure in the retorts. It can be conceived how the conditions will appear when ordinary coal has to be used, as experience has shown that there is with it a great fall of pressure in a 6-metre retort. The third problem—the continuous withdrawal of the coke—is obviously not yet solved, as the recovered coke is now so soaked through that it cannot be put on the market, and a mechanical drawing device is to be applied to each retort. The fact that such an arrangement, working partly under water, will have to be provided for each retort, involves a very heavy burden of machinery on the plant, even if the problem should be solved thereby. The fourth problem—the utilization of the heat of the red-hot coke for the production of water gas—cannot, from Herr Körting's report, be yet regarded as solved, as the greater part of the heat cannot be so applied in the Woodall-Duckham process on account of the unsoundness of the retorts. It is lost in the stream of cold water. Dr. Bueb (continuing) said that, taking everything together, he could only concur with Herr Körting in hoping that Messrs. Woodall and Duckham would pursue their problems further, and that they might solve them all for the benefit of the entire gas industry. But, from what had transpired in the course of the day, he had not much confidence that the problems would be thus solved. It would be apposite to speak now of the statements which had been made in various articles in the "JOURNAL OF GAS LIGHTING," since the first Bueb working results were published in September, to the effect that the Woodall-Duckham process was superior to the Bueb system because it afforded a higher make of gas. But it was a fact that a high make of gas per ton of coal constituted in no way in itself a basis for the industrial appraisement of a gas process, if account were not taken at the same time of the calorific value of the gas produced. A reliable valuation of a gas process could not be made without having ascertained the product of the make of gas and its calorific power, and without knowing the yield of coke, and the quantity and quality of the other bye-products. In vertical retorts, the whole of the coke could readily be converted into water gas, and the make thus enormously increased, if a current of steam were passed slowly through the coke until it was all changed into gas. This could even now be done with the Bueb settings, and not merely 12,000, but 80,500 cubic feet of gas could be produced per ton of coal. This gas, however, would no longer have the composition of coal gas, for which a standard of 5000 calories per cubic metre (562 B.T.U. per cubic foot) might be taken as the minimum calorific value. It would instead consist of coal gas of that calorific value mixed with more than 6½ times its volume of water gas of 281 B.T.U. per cubic foot. Its average calorific power would consequently be only 317 B.T.U. per cubic foot. It was obvious that such gas would be useless to the gas industry, if the standard calorific value stated above were accepted. The process would moreover be practically unworkable, because of the large quantity of furnace fuel necessary for the production of this bulk of water gas, on which account it must economically be a failure. In estimating the industrial work of a gas process, the quality and the quantity of the bye-products obtained were of importance, in addition to the make and calorific value of the gas, and also the wages sheet. That process was not industrially superior which yielded no bye-products, or water gas would long ago have killed our gas-works, but rather that process which afforded the most valuable bye-products. It had been seen that the Woodall-Duckham process—in regard to which neither any authoritative figures as to make of gas nor any information whatever as to the calorific value of the gas were available—afforded no gain in either tar or ammonia, and even showed a deterioration in the quality of the coke. The audience had, on the other hand, heard from Herr Körting that the Bueb process afforded better quality of the bye-products tar and coke—the coke being harder and more resistant, the tar richer in hydrocarbons and thinner—and that a 50 per cent. increase in the yield of ammonia resulted.

The figures given by Herr Körting enabled anyone to form his own ideas as to the industrial value of the Dessau system of vertical retorts.

Dr. Bueb having resumed his seat amid applause,

Herr RIEMANN (Rixdorf) asked if Herr Körting would say to which of the two systems described he gave the preference.

Herr KÖRTING replied that he was not in a position yet to discriminate between them; the working figures for the Woodall-Duckham setting were not available. They did not know what the actual make of gas was, nor the calorific value of the mixed gas from the carbonization of ordinary Durham coal; and until these data were known, no opinion could be formed as to the industrial advantages or disadvantages of this setting. If the former should prove to be equal, the speaker would prefer the simpler Bueb setting; for there was nothing simpler than to open or close a lid, and let gravitation do the rest. The speaker was hostile towards machinery in technical processes, and in the retort-house in particular, when it did not afford an economical advantage. He was very glad to dispense with machinery in the retort-house. For the same reason, he, together with his lamented Chief, Mr. Edward Drory, many years ago went in for inclined retorts rather than drawing and charging machines; and it was particularly gratifying to him (this by the way) that the inclined retort had proved itself superior as a carbonizer to the horizontal, and must be regarded as paving the way to the vertical retort.

Herr W. VON OECHELHAEUSER, the General Manager of the German Continental Gas Company, thought that all present had, with him, received an excellent impression from the communication of Herr Körting, because that gentleman had been at pains to present the matter in a way to which they were rarely accustomed when considering rival systems. The thanks which he had to offer to Herr Körting, in the name of his Company, ought, in his opinion, also to be extended to another colleague who was no more—Mr. Edward Drory. Having regard to the enthusiasm which he displayed in obtaining such brilliant results with the inclined retort at Mariendorf, while so ably seconded and supported by Herr Körting, it showed on the part of these two a true progressive instinct that they were able, in so short a time, to execute as it were a *volte-face*, and go in for quite a new system. Dr. Bueb would recall a visit to Mr. Drory at Berlin, shortly after the latter had seen the vertical retorts at Dessau, when they found in Mr. Drory's office the plan of a new retort-house solely for vertical retorts on a large scale. That was an illustration of Mr. Drory's extremely broad and clear perception; and it was a satisfaction to acknowledge with special thanks the particularly valuable co-operation of the Imperial Continental Gas Association in putting the new system to a trial on a full working scale. The German Continental Gas Company had purposely postponed the publication of the favourable results which Dr. Bueb had been obtaining for them, because it was their practice to go to the public only with what were really *faits accomplis*, and not with premature things. The Company knew well how much harm could be inflicted on an industry by the publication of immature inventions. They would probably have waited for still longer working results, but for the allusions to the secrecy of their conduct in the very journals which later found fault with the working experience as being too short. They had even disseminated the idea that as Dessau was not coming forward with its vertical retort, there must be something suspicious and rotten about it. Thus the Company were moved by such irresponsible rumours to publish an account of their vertical setting last September; and the results obtained since that time—especially those now published by Herr Körting—proved that they were certainly not bringing an immature process before the public. The advantages of the vertical retort had been dilated upon; but there was one point which might be referred to again—the question of labour. It was all-important from this point of view to remember that, on the one hand, a large number of workmen were dispensed with, and, on the other hand, the service was rendered very much easier and more comfortable for the men. The speaker and the German Continental Gas Company attached the greatest value to this consideration. That was the reason why he was taking steps to introduce the vertical retorts as soon as possible at all the Company's works where the introduction was at all feasible. Herr Körting had mentioned also that, in view of the very considerable expenditure which the two Companies had incurred in carrying out the new system, it could not be placed forthwith at the disposal of others without any payment. Times had changed somewhat in this respect. The speaker had constantly tried to publish forthwith, and so to place at the disposal of all, any advance which had been effected under his Company. But he was now the Manager of a Joint-Stock Company, and as such administered the property of others. Having regard, therefore, to the specially large sums which had been expended in this case on the experiments extending over some years, the Company could not afford to be so philanthropic as to renounce the recoupment of these sums from other gas-works which might derive considerable benefit therefrom. They, however, made a free gift to the gas industry of the intelligence that in vertical retorts gas of approved quality could be made along with much better bye-products than had hitherto been obtained with horizontal or inclined retorts. This had not been known as a fact until now. It in no way precluded the varied forces which must combine in order to lead up to this result being attained in some other way as well, and perhaps with still greater effect. In that event, he and his Company would be the very first to adopt whatever was better, whithersoever it came. And if, in particular, a better system was achieved in England, they would not hesitate to adopt and apply it, just as the German and English gas men had not thought twice about adopting, in their time, inclined retorts from France.

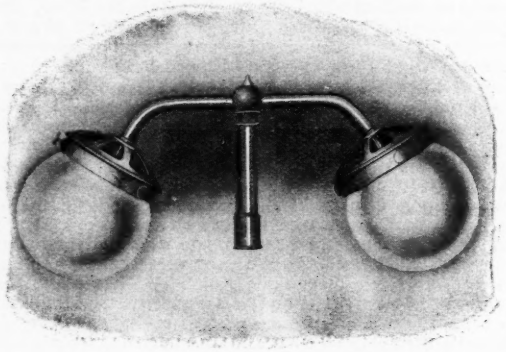
The PRESIDENT having found, by inquiry, that no one else wished to participate in the discussion, expressed in a few well-chosen words the heartiest thanks of the Brandenburg Gas and Water Association to Herr Körting for his lucid, pithy, and momentous communication.

THE "TWIN" INVERTED GAS-LAMP.

A Few Words on Facilities for Saving Consumption.

There is undoubtedly a strong tendency on the part of the gas-consuming public to bestow favour upon inverted burners of the smaller types, on account of their decorative quality, combined with their utility in obtaining a good distribution of light in a downward direction, which is, of course, increased to double when paired, and by equal steps according to the progression of the number of lamps in groups.

Here we have illustrated a twin burner, introduced by Messrs. J. & W. B. Smith, of Farringdon Road. Of course, any make of inverted burner could be fitted up in like manner. But the combination is one whose utility in many situations will be grasped immediately on being seen by readers; and therefore it is worth notice. The two burners do not consume more gas than an ordinary "C" burner; but together they give much more light. It does not appear that one of the lights can be used without the other; and this we regard as a pity, for next to the good downward light given by inverted burners, the subdivision of illumination afforded by the use of two or more of the smaller types of such burners, when each is controlled by its separate tap,



is another recommendation. It is not always that the light of two burners is required; and to be able to shut off one light and leave the other on is an aid to economy. Where only a single tap controls two or more burners, the partial closing of that one tap for economical reasons when the full light is not needed, does not give the same illuminating efficiency for the consumption of gas still going on as can be obtained when one or more burners can be turned off completely, and one left on properly adjusted, and giving its maximum efficiency under the conditions of use. In the case of the "Twin" burner, separate taps could be easily placed on the horizontal arms; and if an air-regulating collar is not already provided, one could be readily applied.

It must be remembered that, expensive as is the electric glow lamp in comparison with incandescent gas-burners for illuminating purposes, it is claimed for it that the "facility for saving" when general illumination is not required is a great consideration as a set-off to dearness in use. The "facility for saving" of incandescent burners must be *provided for*, encouraged, and impressed as frequently as is possible. As we have intimated, the "Twin" burner will be found very useful for numerous purposes. It can be immediately adapted to existing fittings.

Thorianite.

Respecting the discovery of the new mineral thorianite (to which reference is made in the communicated article by Mr. S. N. Wellington, of Colombo, elsewhere in this issue), a report issued by the Colonial Office states that, with a view to encouraging further search for this valuable mineral, a notice has been published giving particulars as to its value, and also stating the places where thorianite and thorite have been found. In the notice, intending prospectors were informed that the Government would for three years undertake not to levy any royalty on this mineral, except in the case of extraction from Crown lands, where the permission to wash will be by agreement on liberal terms. There is a large area—including the Province of Sabaragamuwa and part of the Central, Western, and Southern Provinces—where the mineral may be looked for. The report adds that search is now being made in many localities; but it is not possible to say at present how far a regular supply can be anticipated.

DR. POLE'S FORMULA.

By F. S. Cripps, Assoc. M. Inst. C.E.

Dr. Pole's formula has held the field for many years as being, *par excellence*, the most reliable formula for solving all practical questions on the flow of gas, at low pressures, through pipes. It may not be perfect, it may not fit every case and condition; but for ordinary practical purposes it has proved satisfactory for gas engineers and managers during the past 54 years. Mr. Barlow founded his well-known tables on this formula; and these were further extended by Mr. Newbigging. The author's diagrams, issued in 1892, for graphically solving the various problems connected with the flow of gas, were based on Dr. Pole's formula. Mr. Wright's diagrams, which subsequently appeared in the "Gas World," are also in agreement with it.

The formula in its original form is as follows:—

$$Q = 1350\, d^2 \sqrt{\frac{h\, d}{s\, l}}$$

and so it was left by Dr. Pole. By it, the volume or quantity of gas passed (Q) is assumed to be the unknown factor. But to render the formula more handy for immediate use in solving questions in which the other factors are the unknown quantities, Mr. Newbigging published two inversions of it, and also added three laws or axioms deduced from it. In 1892, the writer added to these, and published a summary in his work on "The Flow of Gas and Proportioning Gas-Mains," p. 15.* This summary has recently been reproduced in the "Gas World" by Mr. Hole, in his articles on the "Distribution of Gas."

Below will be found not only a summary of all the formulæ and rules that have hitherto been published resulting from Dr. Pole's formula, but many more have been added, so as to render the series complete. The additions now made show at once the relations existing between the various factors.

Let Q = the discharge of gas in cubic feet per hour.
d = the diameter of pipe in inches.
h = pressure of gas in inches of water.
s = specific gravity of gas, air being 1.
l = length of pipe in yards.

Then $$Q = 1350\, d^2 \sqrt{\frac{h\, d}{s\, l}}$$

$$d = \sqrt[5]{\frac{Q^2\, s\, l}{(1350)^2\, h}}$$

$$h = \frac{Q^2\, s\, l}{(1350)^2\, d^5}$$

$$l = \frac{(1350)^2\, d^5\, h}{Q^2\, s}$$

$$s = \frac{(1350)^2\, d^5\, h}{Q^2\, l}$$

From the above it is apparent that, other things being equal—

Q varies directly as $\sqrt{h}$	h varies directly as Q^2
" " " $\sqrt{d^5}$	" " " l
" inversely " $\sqrt{l}$	" " " s
" " " $\sqrt{s}$	" inversely " d^5
d varies directly " $\sqrt[5]{Q^2}$	l varies directly " h
" " " $\sqrt[5]{l}$	" " " d^5
" " " $\sqrt[5]{s}$	" inversely " Q^2
" inversely " $\sqrt[5]{h}$	" " " s

s varies directly as h
" " " d^5
" inversely " Q^2
" " " l

A consideration of the foregoing gives rise to the following axioms or rules:—

Quantity—Pressure.

(1) Double the quantity requires four times the pressure.
Or, four times the pressure will pass double the quantity.

(2) Half the quantity requires one-fourth the pressure.
Or, one-fourth the pressure is sufficient for half the quantity.

Quantity—Length.

(3) Double the quantity can be discharged through one-fourth the length.
Or, one-fourth the length will allow of double the discharge.

(4) Half the quantity can be discharged through four times the length.
Or, four times the length reduces the discharge one-half.

Quantity—Diameter.

(5) 32 times the quantity requires a pipe four times the diameter.
Or, a pipe four times the diameter will pass 32 times as much gas.

(6) A pipe one-fourth the diameter will pass 1-32nd of the quantity.
Or, 1-32nd of the quantity can be passed by a pipe one-fourth the diameter.

Quantity—Specific Gravity.

(7) The specific gravity stands in just the same relation to the volume as the length does (see Axioms 3 and 4).

Pressure—Length.

(8) If the pressure is doubled the length may be doubled.
And, conversely, if the length be doubled the pressure must be doubled.

(9) If the pressure be halved the length may be halved.
And, conversely, if the length be halved the pressure must be halved.

From Axioms 8 and 9 it is evident that—

(10) The pressure required to pass a given quant ty of gas varies exactly as the length of the pipe.

Pressure—Specific Gravity.

(11) The pressure required to pass a given quantity of gas also varies exactly as the specific gravity of the gas. Hence if the specific gravity of the gas were doubled, double the pressure would be required.

Pressure—Diameter.

(12) 1-32nd part of the pressure is sufficient if the diameter be doubled; or, in other words, if you double the diameter you only require 1-32nd of the pressure to pass the same quantity of gas.

(13) If you halve the diameter, 32 times the pressure is required.
And, conversely, if you increase the pressure 32 times, the diameter can be halved.

Length—Diameter.

(14) The length can be increased 32 times if the diameter be doubled.
And, conversely, if the diameter is doubled, the length can be increased 32 times and pass the same quantity of gas.

(15) If the diameter be halved the length must be reduced to 1-32nd to pass the same quantity of gas.
And, conversely, if the length be made 1-32nd of the distance, the diameter may be halved.

Specific Gravity—Length.

(16) If the specific gravity be doubled, the length must be halved, and *vice versa*, to satisfy the equation.

Specific Gravity—Diameter.

(17) The specific gravity follows the same laws as the length does in relation to the diameter.

It must be borne in mind, when using the above rules, that all other conditions remain the same when considering the effect of one factor on another in the different pairs.

* "The Flow of Gas and Proportioning Gas Mains," by F. S. Cripps. London: Walter King, 11, Bolt Court, Fleet Street, E.C.

Junior Institution of Engineers.—At the meeting of the Junior Institution of Engineers on Friday, the 20th inst., at the Westminster Palace Hotel, a paper on "Recent Developments in the Construction of Suction Producer Gas Plants" will be read by Mr. William A. Tookey.

Institution of Civil Engineers.—At the ordinary monthly ballot at the meeting of the Institution of Civil Engineers last Tuesday, Mr. Edward Allen, the Engineer of the Liverpool United Gas Company, was elected a member. On the same occasion, it was announced that Mr. C. H. Gott, of Bradford, whose name is known to many of our readers, had been transferred from the class of associate members to that of members.

The "James Forrest" Lecture.—The fourteenth "James Forrest" Lecture will be delivered at the Institution of Civil Engineers on the 2nd prox., at eight o'clock, by Mr. R. A. Hadfield, M. Inst. C.E.; the subject being "Unsolved Problems in Metallurgy."

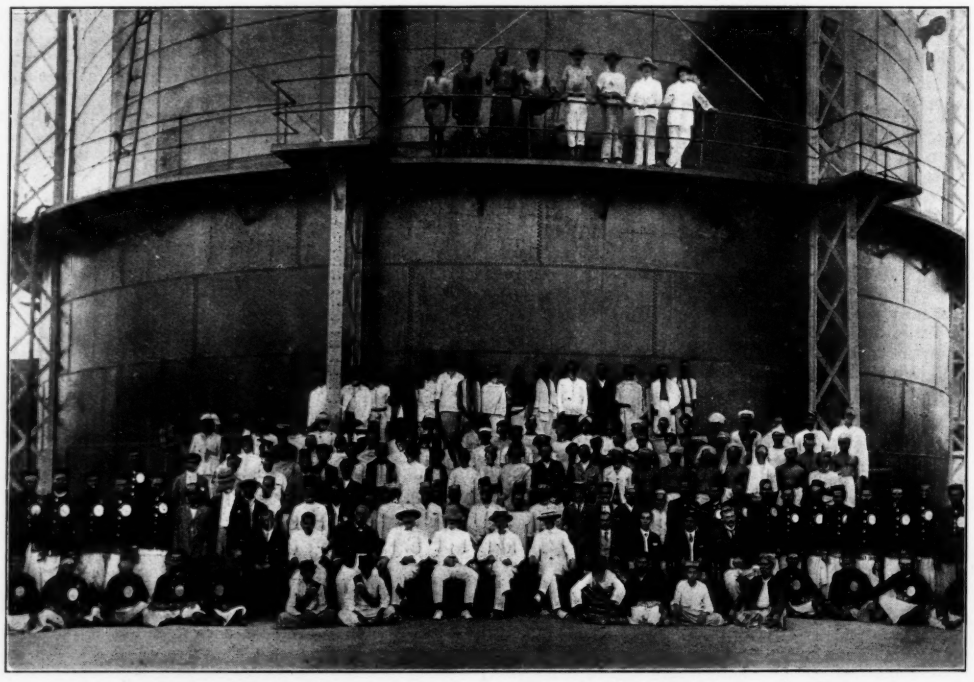
Waverley Association of Gas Managers.—The ninetieth half-yearly meeting of the Waverley Association will be held at the Cross Keys Hotel, Peebles, on Friday, the 20th inst., under the presidency of Mr. James Tulloch. In addition to the formal business, there will be a short address by the President. After dining together, the company will pay a visit to the new Peebles Gas-Works.

CONSTRUCTION OF A NEW GASHOLDER AT COLOMBO, CEYLON.

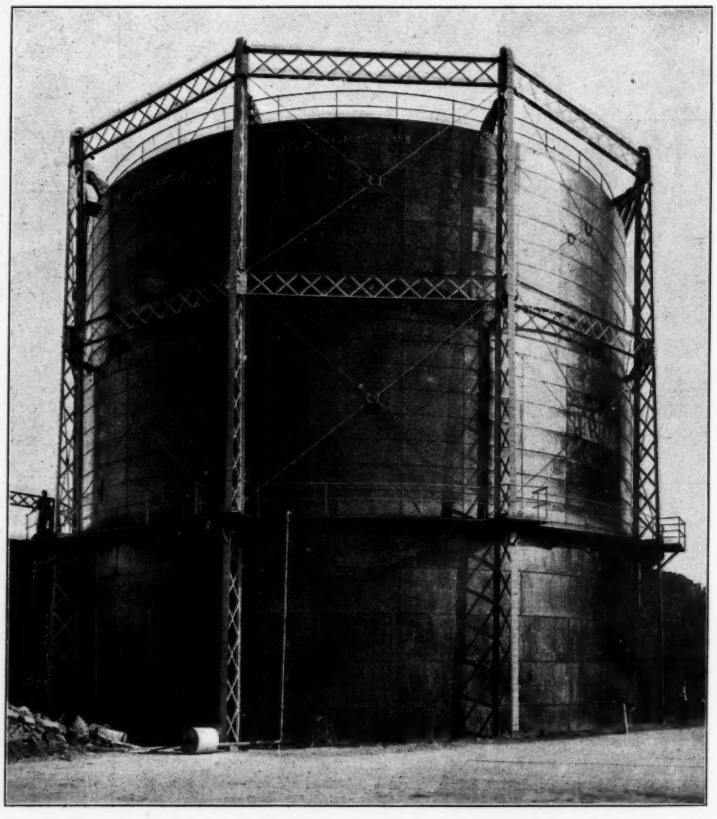
And Other Items of Interest—Thorianite and Incandescent Mantle Making.

By S. N. WELLINGTON, Assoc.M.Inst.E.E., F.C.S., &c., Engineer and General Manager to the Colombo Gas and Water Company, Limited.

At the gas-works of the Company of which I am Manager, we have recently had erected a new gasholder; and I think that some few remarks on its construction may be of interest to readers of the "JOURNAL." As a matter of fact, perhaps the photographs which I am also sending will be to my colleagues at home as interesting as the written details. One of the photographs shows the completed holder; the other is of the officials and workmen grouped by the side of the new addition to the gas plant. The Contractors for the holder were the Barrowfield Iron-Works Company, Limited, of Glasgow.



The tank is constructed entirely of steel, 74 ft. in diameter by 23 ft. deep. It rests upon a concrete foundation, weighing close upon 1000 tons. The foundation is built on running sand, and necessitated our having recourse to a sheet piling apron about 150 ft. long (curved to the radius of the tank) by 30 ft. deep, to prevent the sand being pumped away during subsequent drainage operations in the road adjacent to the gas-works. The concrete foundation was carried out with the aid of two gangs of Tamil coolies (150 men and women in each gang), working night and day. At night, four 1600-candle power Welsbach incandescent lamps illuminated the site; the supply of gas being taken direct from the other holders. The holder is a two-lift one, and is built of steel. It will contain when inflated 170,000 cubic feet of gas. Considerable difficulty was experienced in obtaining competent riveters, as the Tamil and Singhalese fitters as they call themselves are not of the best. Some of them were rickshaw coolies; others, horse-keepers who applied as fitters. However, the work has been successfully completed; and the holder is working very satisfactorily.



Perhaps a few other points of interest may be added while I am writing. The average temperature here (all the year round) is 84°, and rises to 99° in the month of May, just before the burst of the south-west monsoon.

The photo. of the staff and workmen will indicate the type of material one has to deal with in Ceylon. Singhalese, Burghers, Tamils, Moormen, Seedi Boys, Malays, Hindus, and Afghans form the bulk of the labouring and artizan class in the island. A staff of 40 lamplighters light and extinguish the 2500 incandescent street-lamps with which we have to deal, and which vary from 60-candle power as a minimum to 1200-candle power as a maximum. About 70 miles of streets are lighted in Colombo with lamps (copper), made by Messrs. Pintsch, of Berlin. They are wind, rain, and insect proof; and they have been constructed to my own design.

The Company also light the town of Kandy with electricity; our plant being equal to an output of 200 kilowatts. The station is quite up to date, with

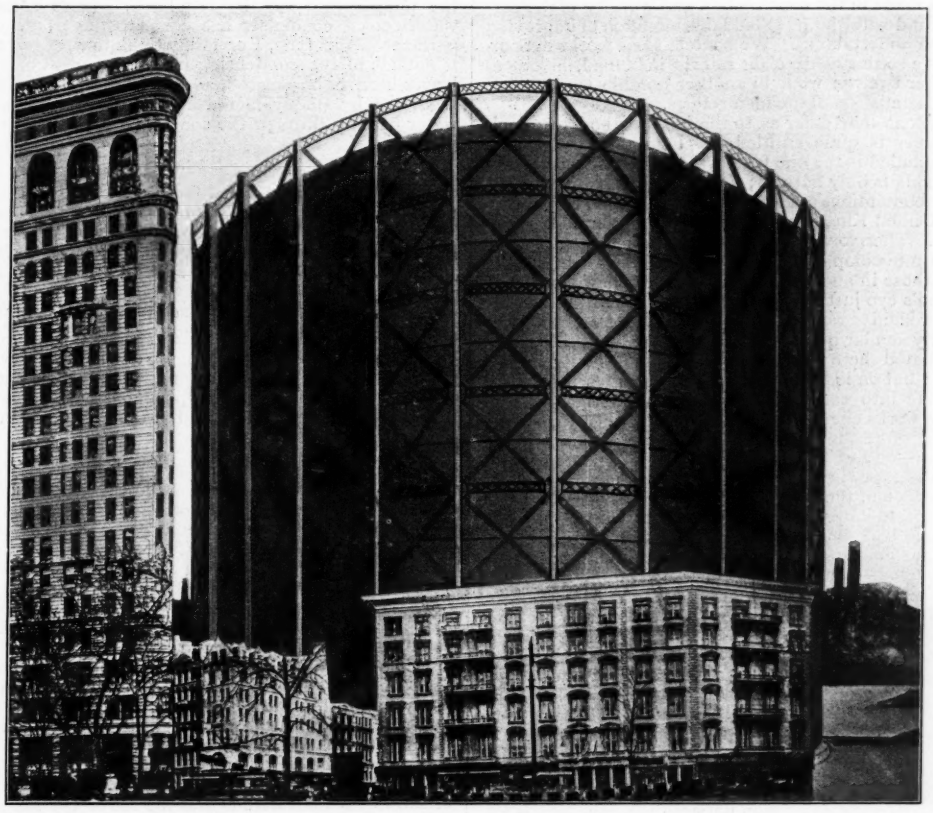
its Bellis-Parker sets, Babcock boilers, and ample condensing power for the engines. About 9 miles of Callender cable and B.I.W. Company's cables are laid in the streets, and most of the Government buildings, including the King's Pavilion, are illuminated with electricity. Considerable revenue is now derived from charging motor-car batteries at the power station; there being a large number of cars of all makes in use in the heart of the tea industry of Ceylon.

It may interest you to know that thorianite has been found in some quantity in Ceylon; and it is believed that considerable business is being done by one Colombo firm, although great secrecy is observed. The writer made a search for thoria some three years ago in some of the rivers of Ceylon; but, having to go to England on sick leave, he was unable to continue his search. About nine months after, thorianite was found in the Babaragamuwa district, and gave a high yield of thoria—about 78 per cent. The writer has lately made good mantles direct from the nitration of thorianite.

THE LARGEST GASHOLDER IN THE WORLD.

From the place of honour as the largest gasholder in the world, the huge structure at East Greenwich is now being displaced by the first of the series of six large holders that is being erected at the new Astoria Works (Long Island) of the Consolidated Gas Company of New York; but how long the new holder will maintain the premier position in regard to size cannot yet be said. We have given, through the kindness of Mr. W. H. Bradley, the Chief Engineer of the Company, and Dr. Elliott, the Engineer-Chemist of the Company, several extremely interesting photographs of the Astoria works during their building, and in the latest (published on Jan. 9 last) a large one was included showing the tank of the first holder under construction. That photograph was only taken on Nov. 24 last; and therefore, smart as our American friends are in executing structural work, it must not be imagined that the holder is completed because now pictorially shown. The accompanying photograph is a suppositious one; its details having been pieced together for the interest afforded in showing relatively the dimensions of the holder as it will be with those of certain well-known buildings in New York City.

The photograph was forwarded by Mr. Robert E. Livingston,



of Madison Avenue; and in the letter accompanying the photograph, he says: The picture has been made across Madison Square Park, Twenty-Third Street, and Fifth Avenue, showing the gasholder standing on the site of the Fifth Avenue Hotel. It is interesting as depicting the comparative sizes of the "flat-iron building" on the south, and the Fifth Avenue Hotel in the foreground. The holder is 300 feet diameter; and, when inflated to its full capacity, it will stand 260 feet high, or only 26 feet lower than the "flat-iron" building. The holder extends from Twenty-Fourth Street south across Twenty-Third Street, taking in the building on the south-west corner of Fifth Avenue and Twenty-Third Street. If this immense steel structure actually stood on the site, it would extend back to within about 100 feet of Sixth Avenue. The holder will, when completed, hold 15 million cubic feet of gas, or the total capacity of the six holders will be 90 million cubic feet. The new Astoria gas plant, when the scheme is completed, will have a daily producing capacity of 240 million cubic feet of gas. In Greater New York about 123 million cubic feet of gas are consumed each day, and about 70 millions are daily used on Manhattan Island and The Bronx. The excavation under the holder is 48 ft. 6 in. deep. The steel tank weighs about 8,000,000 lbs.

The Smethwick Railway Siding.

Last Sunday week the task was successfully accomplished of carrying the bridge for the Smethwick Gas-Works siding (to which illustrated reference was made in the "Journal" for March 27, p. 859) across the canal. An attempt was made to get the bridge over on the previous Sunday; but owing to the very spongy nature of the ground—ashes, &c.—on which the bridge has been built, only very slow progress was made. The work was further hindered by some violent snowstorms; so that at about 3 o'clock in the afternoon it was decided to abandon operations for the day. The bridge then overhung the canal about 50 feet. The operations—which were under the superintendence of the Engineer and Manager, Mr. Vincent Hughes—were witnessed by the Mayor (Mr. Adams), the Chairman of the Gas Committee (Alderman C. W. Pinkney), the Secretary of the Gas Department (Mr. W. J. Sturges), and several members of the Council. The construction of the siding will involve an expenditure altogether of £12,000; but a considerable sum will be saved over the existing system of cartage. The contract for the erection of the bridge was entrusted to Messrs. E. C. & J. Keay, Limited. As already stated, the bridge is 150 feet long; the weight being 150 tons.

ANNUAL "INFORMAL" MEETING OF SCOTTISH GAS MANAGERS.

The Twenty-Third Annual Informal Meeting of Scottish Gas Managers was held in the Grand Hotel, Glasgow, last Wednesday. Mr. W. M'Crae, of Falkirk, presided over a very large gathering.

PRESIDENT'S ADDRESS.

The President, without ceremony, proceeded to deliver his Presidential Address, as follows.

Gentlemen—Before beginning my address, my first duty is to thank you for the honour you conferred upon me in appointing me Chairman of this meeting. Knowing as I well do the excellent men who have occupied this chair in years gone by, it is no easy task for me to follow in their footsteps; and although the address will be somewhat brief, I trust it may be of interest, if not instructive, to the present gathering.

Since our last meeting, no very great alterations have taken place in the manufacture and distribution of coal gas, although I may say everyone is striving to get the best apparatus, in order to promote the highest results from the works under his charge. As has been well and frequently said, the first part that a gas manager has to look to is the carbonizing department; for undoubtedly if the money is not made there, he cannot pick it up at any other part of the process. In recent years, various alterations have been made in the construction and working of the carbonizing plant, and with the most laudable intention of improving the profits of the undertakings. We have in some works in Scotland regenerative settings with eight retorts in a bed, in others eleven, in another twelve; while in another notable works there is a very large installation of inclined retorts.

Although opinions may differ as to the best method to adopt, still each engineer is quite entitled to claim that the system which he has installed is the one from which the best results can be obtained. This is only natural; and no one can dispute the accuracy of the contentions put forward, because in no two undertakings in the United Kingdom are the working conditions precisely the same. Therefore it would be invidious, as some people attempt, to institute comparisons between the results obtained in one works and those in another. For instance, one works that I have in my mind's eye just now produces gas at a certain figure; whereas another similar works, but not such large size, produces gas of practically similar quality, but at a higher figure.

To the uninitiated there seems to be something amiss in this state of affairs; but on looking into the matter, it is first of all necessary to take into consideration what the carriage of coal costs to the one works compared with the other, also what is the cost of removal of residuals from the one compared with the other, and, again—one of the most important considerations to be looked at—the capital charges of the two works we are comparing. Were some of the fault-finders that we as gas managers have in our midst, to know all these details, and fully appreciate them, there would be less interference and less grumbling at the actions of the gas manager and the staff under him. Again, the machinery employed—that is, in the works of larger size—may be entirely different in construction, cost, working, and upkeep; and although it is a matter of opinion as to which is the best, the point remains that the gas engineer or manager is the one who ought to know what is best suited for his works, and he alone should be the judge of what apparatus or machinery he should employ.

In speaking of comparisons, there is a matter which has very often struck me as not being fully appreciated by the majority of gas engineers. You will pardon me for speaking very frankly; but I think it is in the interests of our profession that I should give expression to my opinions regarding this. What I refer to is the great want of a bond of union between the members of the gas industry in Britain and elsewhere. I am quite sure that some members present have experienced the fact that members of our councils or companies have written them asking for particulars regarding carbonizing or other results, and this without the knowledge of their gas manager. To acquire knowledge is a most desirable thing at all times; but when any such communication as this is addressed to any manager, if he would simply write to the manager of the works from whose chairman or other member of the Board he had received the communication and knowing the reason for the question being asked, it would greatly protect us all against the unexpected assaults which are made by those who know nothing whatever about our business and what they are interfering with.

There are now on the market many forms of charging and discharging machinery—all simple and comparatively inexpensive; and I would recommend all gas managers in charge of medium-sized works to consider the advantage or otherwise of such machinery, as by its adoption the onerous labour of the gas-stoker is done away with, and, at the same time, in many cases the introduction of such machinery would be fraught with beneficial results to the undertaking. As I suppose is well known, we have recently installed stoking machinery in the new works at Falkirk—in fact, such machinery is the first of the patent to be adopted in any gas-works; and while it is giving very satisfactory results, I do not think it necessary to enter into details here, as I hope to give at an early date full particulars of its working. I would, however, extend a hearty welcome to any gas engineer or manager to come to Falkirk and see for himself what we are doing.

Before departing from the carbonizing department, I would just refer briefly to the communications to the Technical Press from our friend Mr. Herring, regarding the advisability of vertical retorts for producing illuminating gas, and also the more recent communications from Mr. William Young, of Peebles, referring to the vertical retorts which were designed as far back as 1867. I am sure that the whole profession will welcome with the greatest delight and pleasure any proposal which either or both of these gentlemen may bring before us for the introduction of any design of retort that will be an improvement on that which we already have, and the adoption of which will result in bringing greater profits to the boards which we have the honour to serve.

Condensation.

In time gone by, forms of condensers were many and varied. There was the old battery condenser, consisting of a rectangular box with cast-iron pipes passing horizontally through it, and another form of which is largely used at the present day—the vertical pipe condenser. Latterly, the condenser of the annular type was brought into use, and has done very good work, consequent upon the comparative ease with which to a great extent the temperature can be regulated. More recently still, the water-cooled condenser has come to the front. From my experience of this type, I certainly think that, at least for a portion if not all, of the condensing plant of a gas-works, its adoption leaves little to be desired, as the temperature can be so easily regulated by simply increasing or decreasing the quantity of water passing through the condenser tubes in proportion to the gas made.

Exhausters.

I do not think that I require to take up your time enlarging upon the working or design of these, as they are well known to all of you. Only one thing I would advise, that anyone putting in exhausters should have them of ample size, so that even when working at full capacity, they should be driven at only moderate speed.

Tar-Extractors and Washer-Scrubbers.

These should be of ample size, so that the gas may pass slowly through them; for by so doing the tar-extractor will more completely free the gas from tarry matters, thereby ensuring that the scrubber will do its work of purifying from ammonia, &c., in a more satisfactory manner, and at the same time reduce the duty of the purifiers proper.

Purifiers.

During recent years luteless purifiers have largely come to the front, and I think deservedly so, for the following reasons: Take a purifier of (say) 30 feet square of the old water-lute type, the mechanism required to lift the cover of same (which would weigh about 10 tons) would of necessity be a large and expensive item; whereas with the luteless purifier of the same size one can have four lids on each box, and each lid would not weigh more than about a ton. Therefore the means for removing such lids could be of the most simple and inexpensive construction. I have also found from experience that the emptying of a luteless purifier with four lids, compared with one on the whole purifier, is not really a more difficult, tedious, or expensive job. Then again, with water-lute purifiers, the greatest care has to be exercised in frosty weather to prevent freezing of the water; otherwise considerable damage may be done to the lutes themselves or to the sides of the purifier cover. I know that one opinion against the introduction of the luteless purifiers is that the life of the rubber joint will be very short, and the cost of renewals very expensive. But from works that I know of where these purifiers have been in use for eight to ten years, and where care has been exercised in the removal and replacing of the purifier covers, the rubber joint is as good to-day as when the purifiers were first built. It may be said that the water-lute purifier provides a safety-valve in case of stoppage between the purifier and the gasholder. But I do not think that this opinion is of much weight; for, irrespective of whatever truth there may be in it, I think the advantages of the luteless purifiers are paramount over anything that can be said in favour of this theory.

Distribution.

This is a subject on which, of course, all gas managers have a large interest. Not only do I refer to distribution for domestic use, but also for public lighting; and the advancement in both of these directions in recent years has been marked, and has in no small way tended to aid and promote the success and development of our industry. Take domestic lighting. Time was when a person wanting a supply of gas, this would not be given without a deposit being paid before the gas was turned on. Then they had to pay the gas bill every three or four months as the case might be; and to people of small incomes a bill of 7s. to 10s. meant a big hole in the weekly earnings. With the advent of the prepayment meter, things were changed; and the change has brought about a benefit not only to the consumer, but to the supplier. The immense value to people of limited means—that they

are able to get whatever gas they want for lighting and cooking by simply dropping a penny in the slot, and that as often as required—must have been patent to everyone here. There is another important change that it has wrought to them—the placing within their reach of a safe means of illuminating their homes with gas instead of cheap paraffin lamps, and their accompanying ill-smelling oil and attendant dangers. This is, I am sure, borne out by the small number of accidents arising from the use of lamps now compared with what were seen say ten years ago. Of course, some outsiders may argue that we are giving this benefit to the slot consumer at an extra charge, and to the interest of the supplier; but bearing in mind the greater initial cost of the prepayment meter, together with the extra cost of collection and upkeep, compared with those of the ordinary type, the only real profit that the seller has is in the extra quantity of gas burned in consequence of their adoption. There is also very little chance of bad debts occurring unless some "honest" individual removes the meter bodily and breaks into the cash box.

The other portion of the distributing system to refer to, and which is of the greatest importance to us, is the public lighting. To begin with, I have no hesitation in saying that the management of the public lighting of any district should be entirely in the hands of the gas engineer, as the gas so consumed is not registered by meter as in the case of the domestic supply, and it is only reasonable to think that, when such is the case, the man who is responsible for the percentage of unaccounted-for gas should have charge of the automatic appliances for controlling the quantity of gas burned by the individual lamps, as well as full charge of the employees in this department. But what do we find? Lamps which should be consuming (say) 3 cubic feet per hour will, on examination, be found to be consuming anything from 4 to 5 cubic feet; and also those which should burn (say) from 7 o'clock in the evening until 6 o'clock next morning—11 hours in all—will be found burning at 7.30 in the morning or later. Yet the gas manager has absolutely no redress for this theft—I can call it nothing else—of his manufacture. I would not say that such a state of things is wilful on the part of those having charge of the lighting arrangements; but were it in the hands of the gas manager, there would only be one person to blame, and that the manager himself.

Further regarding this department, the thanks of those, not only at home but abroad, are due to Baron Auer von Welsbach for the system of incandescent lighting of which he was the pioneer, and which has given a new life to the gas industry all over the world. Compare the streets at night in some of our large cities with what they were ten or twelve years ago, and I think it will be agreed that there is as large a difference as there was when they were first lighted by gas compared with the old oil-lamps. Not only has the ordinary incandescent burner aided the gas industry in a marvellous fashion, but what with high-pressure gas and other means of incandescent lighting, our formidable rival, the electric light (which in the year 1878 was to sound the death-knell of gas undertakings), has really and truly to take a back-seat. And I say so advisedly. Not that I have any personal animus towards electric light in any of its forms, but because of what has taken place in such cities as Berlin, Paris, and, nearer home, London and Liverpool, where the electric light, after having been in use for a number of years, has been supplanted by high-pressure or other means of incandescent gas lighting, to the cities' and the ratepayers' benefit from the point of economy, as well as in the better lighting of the streets.

The streets of many of our Scotch towns are beautifully lighted by incandescent burners; but I think if anyone were to see the lighting effect in Bloomsbury, Whitehall, and some other parts of London by the incandescent burner, he could not but be impressed by the adaptability of this system for public lighting. One thing I have experienced, and it is that there is no use trying to have satisfactory results from incandescent lighting with the ordinary street-lanterns which were previously used for flat-flame burners, as, unless the lanterns are constructed entirely wind and dust proof, the number of mantles required will be excessive, and the whole results most disappointing. As I have said, I give this from my experience of having had over 1000 lamps under my charge, and having tried to use (with slight alterations) the original lanterns with flat-flame gas-burners. Without a single exception, the results were disappointing in the extreme, except in very calm weather; whereas with the same system in properly-constructed lanterns, and properly fitted up, the results were most satisfactory.

When speaking of incandescent lighting, either for domestic or for public use, I think that I am fully justified in saying that the whole gas industry is under a deep debt of gratitude to the South Metropolitan Gas Company for their far-seeing policy in acquiring that valuable deposit of monazite sand in South America, at the very large cost of nearly £25,000. Sir George Livesey said at the last meeting of the South Metropolitan Company that the effect on the price of thorium since the deposit was acquired has been to reduce the price from 53s. to 27s. per kilogramme, thereby ensuring that the cost of mantles in this country will be continually reduced, or at least there is no possibility of their price being increased to a prohibitive figure. That being the case, if the Directors did not require to work this deposit themselves at the present time, they have always got it, and can work it when necessity arises.

I think I have touched on all the points of particular interest to us as professional men; and though perhaps I have done so briefly, I have to thank you for your patient hearing.

Discussion.

Mr. W. B. M'Lusky (Perth), the Convener of the meeting, proposed a hearty vote of thanks to the President for his excellent address. They might not agree with the President's view-point in every case, and they might not agree with all his conclusions; but they would recognize that the address was thoroughly up-to-date, and did not omit any of those matters which engaged the attentions of gas managers to-day. The President had referred not only to the operations in the works, but had also taken them outside, to that part of their operations which was certainly of greatest moment at the present time—viz., the advancement of gas lighting in their streets, and in the homes and business-places of the people.

Mr. A. Yuill (Dundee) remarked that the President had given them a cue to the discussion, to some extent, in mentioning the interference which Commissioners at times showed in dealing with matters which many were of opinion they did not know much about. But he did not think that, in mentioning this, he was going to debar them from taking part in, and criticizing, any of the matters he had placed before them. He was sure he would court this, because it was only by criticism, and fault-finding sometimes, that they arrived at the best result. By such means their ideas were broadened, and they were led to see things in a different light from what they would otherwise have done. In beginning with the retorts—this was natural, unless they started with the coal—the thought struck him that, in speaking of settings of 6, 8, 10, or 12 retorts, they had there got the spirit of evolution in the initiatory stages of their manufacture. He remembered hearing a debate that took place on one occasion—not at an Informal Meeting, but some other meeting—upon the question of whether it was possible to heat five retorts by one fire. Perhaps some of them there might have taken part in, or listened to, that debate. In gas-works now, instead of heating five retorts, they were heating twelve retorts with one fire—showing the evolution, which had taken place in the manufacture of gas within a short period. The President had drawn their attention to the question of the vertical retort. He believed there were great possibilities in this, that the form in which gas would be produced would be a combination of the vertical retort with one for the production of water gas. Some of them would have noticed, a week or two ago, in the Technical Journals, that a patent had been taken out which was a combination of a retort for the generation of gas from coal, and, after the coal had done its work, the resultant coke was utilized, to some extent, in the production of water gas. After the water gas had been produced, no doubt means would be taken, in some way or other, to have it carburetted, so as to get, from ordinary coal, the illuminating power they might desire. The President had also drawn attention to annular and other condensers; and he thought his views on this subject were thoroughly sound and correct. Anyone who had had experience in passing through severe winters, with the ordinary form of condensers—and what was even worse, the annular form of condensers—would at once realize the advantages which water-cooled condensers would be to them. With these, they could get any temperature they desired; and they all knew the deleterious effect which extremes of temperature had in interfering with the hydrocarbons in the gas. It might be advisable, on the part of any of them who had the ordinary form of condensers, to try to protect them as much as possible. They would not, he presumed, be troubled with this before another winter; but it was a matter which they required to deal with carefully, so as not to lead to the condensation of the hydrocarbons and light-giving properties in the gas. The President had also mentioned the desirability of having exhausters of ample size. In this matter he had formed an opinion, and acted upon it. Suppose they required to pass 50,000 cubic feet per hour through the exhausters, he thought it would be advisable, even from a commercial point of view, to have the exhauster three or four times the capacity. By doing this, they would have the engine running much slower—thus saving the depreciation which was attendant upon machinery running at a high speed. He had also touched upon the tar-extractor and washer-scrubber. He thought that one of the best forms of washer which was before them to-day was that which had been known for some time as the Livesey washer. Anyone who had gone into the consideration of this subject, saw the benefits it gave them, compared with the ordinary form. In his own case, he had a Livesey washer in one machine, and an ordinary washer in another. He had made arrangements for the conversion of the ordinary into a Livesey washer. He did not wish to go into this matter, or to explain the difference of working between the two, because it was well enough known to all the members there. What he had found of difference was that with one machine he was able to work up the liquor in the washer to about 16° Twaddel—thereby giving him an absorbent medium for the sulphuretted hydrogen and carbonic acid gas; and in the scrubber he was able to work it up to from 4° to 5°. If anyone were ever placed in the position of requiring new purifiers, he should not hesitate in arranging for the introduction of luteless purifiers. Some had raised objections about the absence of the lute destroying the safety-valve which they sometimes experienced; but if he were putting in a set of luteless purifiers, he would arrange to have a safety-valve put into the main system of piping between the outlet of the scrubber and the inlet of the purifier. The President had given them some room for discussion, in the matter of public lighting; and he would pardon him if he just differed from him in this

connection. He did not want to flatter himself when he said he had introduced the incandescent system of gas lighting in all the public lamps of the city; and he had not altered them to any great extent. The lanterns certainly required a little modification; but he found that they obtained very good results by substituting incandescent for flat-flame burners in ordinary lanterns. They had all experienced the benefits which were derived from inverted burners, from an artistic point of view, and also in regard to efficiency. He did not wish to advertise anyone's goods; but Bray's inverted burners were looked upon as being as near perfection as any. They gave a very much better light than ordinary upright incandescent burners.

Mr. M'Lusky suggested that, as some members of the Junior Association were present, they might offer a few remarks.

Mr. J. Macleod (Provan), the President of the Western District of the Scottish Junior Gas Association, said the washer they used at Provan was Walker's, and it gave wonderful results. With it they could work up the liquor to 18° Twaddel, operating two in series, and run their gas through free from ammonia at the outlet of the second scrubber. He thought this result was quite equal to that obtained with a Livesey washer.

Mr. D. Robertson (Dunoon) remarked that one point in the address which deserved special attention was that relating to public lighting. He had had experience in the supply of gas for public lighting where he had no control and also where he had control; and the pleasure he had felt during the past five years, since he had control, more than compensated him for all his previous trouble and annoyance. He thought it was only right that the man who had charge of the gas supply should also have the supervision of the lamps. Street-lanterns had been referred to; and it was certainly necessary that they should be wind-proof—otherwise incandescent gas lighting became a pure farce, as the mantles had to be renewed every second or third week. After a storm of wind they had to change probably 50 per cent. of the mantles, unless the lanterns were what might be termed first-rate. But it was not necessary to put in new lanterns. About five years ago he introduced incandescent lighting, and ordered some lanterns from London, thinking he would get a first-rate article. They were anything but this; they were so open to the wind that they had to be stuffed with oakum. Latterly they had taken to utilizing the lanterns they had been using for flat-flame burners; and with these they got first-rate results. If they puttied the panes well, and made some slight alteration in the ventilator, they got as good results as from the new lanterns.

Mr. J. M'Gilchrist (Dumbarton) said one point which struck him was the comparisons which were sometimes made between one gas-works and another. He noticed that Mr. M'Donald, of Denny, was present; and he could not help thinking about the trouble he had passed through during the winter in respect of the comparisons made between the capital and the working of the Denny and the Kilsyth Gas-Works. He saw that they had one or two "full-dress" debates upon the subject in the Denny Town Council; and he was sorry to say that they did not yet know the reasons, beyond the one that Kilsyth had a smaller capital than Denny. In Kilsyth, the Gas Company became frightened by the threats made about an opposition Company; and they had the idea that the Corporation could start gas-works in competition with the existing works, and, in a panic, they sold their undertaking for less than one-fourth of its value. One of the shareholders, who had never been consulted in the matter, commenced an action; and he (Mr. M'Gilchrist), with the late Mr. Stewart, of Greenock, tried to prove that the gas-works were of at least four or five times greater value than they were sold at. But the Judge held to the opinion that a bargain was a bargain—a contract was a contract—and that, supposing the Company had sold at that much less, still the contract held. Now, it was very unfair of the critics to attack the two things in the way they did, because in Denny the Corporation paid the full value of the undertaking, which was at least four or five times that paid by the Kilsyth Corporation. He thought this illustrated the point that two works were hardly ever found in the same condition. With regard to the interference by chairmen of gas companies with the management of their undertakings, he took it that no manager who attended their Informal Meetings would ever dream of communicating a bit of information to any chairman—unless he was paid for it. On the question of public lighting, he was sorry he was outside the consensus of opinion, so far as the speakers that day were concerned. It was perfectly right that there should be a lighting inspector, independent altogether of the party who supplied the gas. He thought the gas manager had quite sufficient to do in looking after the manufacture of gas. A superintendent of lighting might report defects, and the gas manager had it in his power to keep the light aloft in front of his own works, showing what could be done with incandescent lighting. If any complaints were made with regard to lighting, he could then say: "Look at the gas-works gate; that is our standard." He thought that, generally speaking, gas managers were too ready to take upon themselves duties which did not appertain to them. If they had fewer of these outside duties to perform—such as street lighting and sulphate of ammonia manufacture—they might be able to give more attention to the manufacture of gas, and possibly with equally good results to the corporations or companies they served. As to condensing, possibly a great deal of trouble could be got over, in regard to the regulation of the temperature, by simply adopting sail-cloths—hoisting them when required and taking them down when not needed. No great outlay was required for sails, and they could be adapted to regulate the temperature just as a manager wished—and this was all that was wanted in the condensation of gas. When they introduced water condensers, it sometimes meant considerable cost, because the water had to be utilized time after time; but when the work could be done so simply as he had been doing it, it was altogether unnecessary to have the water system. Perhaps, as time went on, they would find the condensers, washers, and scrubbers would be better under cover altogether. In fact, he was coming to the opinion that other parts of the plant required more protection than the purifiers.

Mr. J. W. Napier (Alloa), referring more especially to the vertical retort, and looking to his short experience in oil-works, said what struck him as being an essential difficulty in adopting this retort in coal-gas manufacture had been that of the radiant heat. In shale-oil works, the efficiency of the vertical retort, in the matter of economy, depended on the simple fact that they were carbonizing material in bulk. They had a considerable quantity of material with a very high retort, thereby reducing costs. In ordinary gas-retorts, they were working with a large number of units and a small quantity of coal; but if they took the principles attendant on the one hand upon shale-oil manufacture, and on the other upon coal-gas manufacture, they would find that radiant heat was the determining factor. That was to say, if they attempted to carbonize coal in bulk for the purpose of gas manufacture, they were thereby, in great measure, courting failure. No doubt very great advances had been made, more especially looking at the matter from the theoretical point of view; but, at the present moment, having read very closely the communications recently made to the "Journal," he was still of opinion that something was wanting which would carry to a successful issue any system of vertical retorts adaptable to the manufacture of coal gas. The President had referred to regenerative retort-settings; and he thought that he might look forward to the time when, instead of having one producer for each setting of retorts, outside producers, supplying a large number of settings, would undoubtedly turn out to be the more economical arrangement. When they came to consider that producer gas was a very strong element they had to oppose, surely they ought not to go past it in considering the efficiency and economy of their retort-house operations. With regard to the introduction of machine charging for medium-sized gas-works, he could only reiterate what the President had said in the matter of the advantages to be derived from this mode of working. Time was when machines that were suited for huge works were quite impossible in smaller ones; but now, when they had the types they were quite familiar with, it was certain that works sending out 60 million cubic feet and upwards ought to adopt the projector type of charger. And, parenthetically, it might be said there was no doubt as to their efficiency. The installation at Alloa had turned out very successful indeed. They found, not only very great economy, but also a smoothness of working and a convenience which the men appreciated. It was not a thing which required any specially skilled labour, as in his works the ordinary stokers had been quite capable of carrying on operations in connection with it. In the matter of the supply of electricity for the machines, instead of taking it from a public supply, it would be more economical and satisfactory to make it oneself. He quite agreed with all that had been stated with regard to the Livesey washer; and, as to scrubbers, he was somewhat in the position of Mr. Macleod, because he felt that where they had a scrubber having a number of divisions they were thereby enabled to wash the gas with different strengths of liquor—thus providing a means of purification, using the liquor just as they would lime or oxide. He held strongly to the belief that condensation consisted in the carrying out of two principles—not merely the cooling, but also the friction. Mere cooling was not condensation. If they had an annular type of condenser, they were not carrying out condensation in the manner in which it should be. The President spoke of the danger of paraffin lamps. It was not the lamp which was the danger, but the oil; and he hoped, now that there had been a change of Government, attention would be aroused, and that, notwithstanding the opposition of the London County Council, and the attitude which the otherwise well-informed "Journal of Gas Lighting" had taken up in the matter, the flash-point of oil would be raised.

Mr. W. Ewing (Greenock) was of opinion that twelve retorts in an oven was a step in the right direction. He understood that in some works 48 retorts were heated by one producer. He was not so confident that they were successful; but he was sure that twelve retorts heated by one producer gave first-rate results. They had the results obtained in the works over which their friend Mr. Yuill was Engineer and Manager. The amount of coke sold, and the yield of gas per ton of coal, were evidences that the settings were economical. Mr. Yuill was in the position of selling the largest volume of coke per ton of coal carbonized in Scotland. In fact, it was scarcely exceeded in England. Therefore it was evident that a setting of twelve retorts, against eight, was the proper setting for the economical production of gas, so far as they had yet advanced. Comparisons were often made as between works; and, as their worthy Chairman had remarked, it was necessary that capital and other items should be taken into consideration. Recently he was making a comparison between his own works and another making about 150,000 cubic feet more per day; and he was greatly struck by the fact that the scrubbing

power of the other works was fully five times more than in his case. The purifying power, also, was practically three times more than he had. But, of course, his works were too small in these respects for purposes of comparison, because, in order to make a comparison, they must take into account the different working conditions, which, in his case, tended to create greater waste of material and higher wages. Mr. Napier, he was pleased to see, was in a position now to report on the working of the De Brouwer machine. It was three years ago now that he had the drawings ready for an installation of this kind of machine—he believed he was the first—but, unfortunately, they had another machine of an older type in use at Greenock, and the newer installation could not be added. Since then he had taken very great interest in the De Brouwer and similar plant. They had two classes of this type of machine in operation in Scotland—one at Falkirk and the other at Alloa. He did not know of any other installations in operation at present; but there would be one or two at a very early date. He was pleased to hear Mr. Napier say that it was a success. His opinion, from the first time he saw it in operation—and even before he saw it—was that it was a machine suited to imitate hand charging perfectly. The President mentioned what he might call the lack of sincerity, or the want of bond of union between gas managers. Well, he must say that, recently, when travelling on deputation to various works in Ireland and Scotland, the deputation were very much struck with the courtesy and kindness extended towards them. No doubt there might sometimes be a black sheep in their midst, who had a tendency to lower the dignity of the profession. The President referred to the inquiring committee-man. This was a sort of man they had always with them. He had received many inquiries during the past few years from different committee-men; and the way he dealt with them was this. He first of all asked the gas manager what was wrong, and sent him a copy of the letter he had received, requesting him, if possible, to guide him in his reply; and he answered on this basis, sending the gas manager also a copy of the reply. Vertical retorts had come very much to the front that day; and, along with several other speakers, he was decidedly in favour of them. From vertical retorts he thought it should be possible, and was possible, to get a greater volume of residuals and gas. Condensation had also been prominent. It had been suggested by Mr. M'Gilchrist that they should use canvas sheets. In places abroad, where the sun was much stronger than at home, very often the condensers were protected by arrangements similar to venetian blinds, which gave always an upward current. Like some of the other speakers, he was rather in favour of the washer-scrubber; but if they were not very particular as to a candle or two in the illuminating power, the tower scrubber was a very good piece of working plant. On his travels recently, he was very much struck by the arrangements in the Edinburgh works for scrubbing. Everything was under cover, and could easily be controlled. He found that with scrubbers equal to about a fourth or fifth of his present requirements, in the dead of winter, owing to being on the seaboard, it was next to impossible to get the proper temperature of between 50° and 60° at the outlet, unless they used steam, which, of course, had an effect upon the liquor. The luteless type of purifier was now generally favoured. It was some years since he came to the conclusion that it was the more suitable form. It would be interesting to have the experience of those present as to the kinds of grid used. About fourteen years ago, on account of having small purifiers, he took out two layers, and added 18 inches of lime, against 4 inches formerly; and he found that this was a great saving in labour and material. But, of course, under some conditions—for instance, if their scrubbing power was a little defective and their purifiers small—it was impossible to do this, because a slight film of tarry particles got on to the bottom of the lime, with the effect that the back-pressure gave serious trouble and inconvenience. The valves were also an important item in connection with purifiers. Some favoured even now the old hydraulic centre valves. Naphthalene was getting more common in Scotland; and if they used faced valves there was a tendency for it to get on to the faces, and then there was a leak. The question was whether it was more profitable to use the older form of centre valves or the newer form of faced valves. There had been considerable comment on distribution. This, of course, was one of the most important factors, after the manufacture of gas. They must get it away. In Greenock they had, apparently, a very large leakage. They did not correct for temperature and pressure. When he did so, however, it took 30 per cent. off the leakage. In consequence of their plant being too small for the work, at the inlet of the purifiers the temperature might be between 50° and 60°. He often brought it down lower, for the sake of purification. At the outlet, owing to the ordinary friction, notwithstanding small layers of carefully prepared lime, the temperature had often been 105°. Purification under these conditions was next to impossible. About five years ago they altered the existing street-lanterns to suit lighting with incandescent burners; and generally speaking they had given every satisfaction. The breakage of mantles was now very small. They altered the lanterns by placing a small side door near the top of the astragal and lighting with an ordinary torch. The cost, he thought, ranged from 5s. 6d. to 7s. 6d. per lantern, exclusive of the burners. He had the lighting in his own hands. The people of Greenock were very lavish regarding the supply of gas to the lamps. In working expenses alone they lost £1600 a year in lighting, exclusive of the quantity of extra gas consumed, owing, of course, to the method upon which it was arranged. He had not got the Peebles clock system, which, he thought, was invented about 28 years ago by Mr. Bruce Peebles, and which, for the checking of the lamplighters, was the most perfect system they had. It would surprise them to learn how much the introduction of checks saved in public lighting.

Mr. D. Vass (Airdrie) said that some of them were not in a position to introduce eight, ten, or twelve retorts in an oven. Though it might be most economical to instal twelve in other works, with him this would not hold good. He introduced eight retorts in an oven in making an extension a few years ago; and he had now reverted to six. He had done so for the reason that sixes met his requirements, in the raising and lowering, in the approaching of the winter season, or the receding from it, better than the eights did. In his case, if an eight were lighted up, it would go on for about a week, and then they would have to damp it down, and go on until the time had come round, and then start again with the eight; and that might be repeated two or three times before they got the one setting of eight into full working. Every manager had to make his plant to suit his district. If the district increased, then, of course, the size of the retort settings could be altered to suit it. With reference to the vertical retort, he could see some of the difficulties mentioned by Mr. Napier. They knew the trouble of carbonizing 3 or 4 inches depth of coal. What would be the difficulty of it were a matter of 2 feet depth of cold coal going into a vertical retort? The gases would be reduced very much in quality; and, in fact, tar would be formed at first, and they would be practically, by introducing the vertical retort, going back upon the making of water gas, pure and simple. The President advised a larger size of exhausters. Probably he was keeping in view that they should all, at first, if possible aim at having duplicate sets. He found that a duplicate set came in very handy for dealing with midwinter and midsummer requirements. They were all agreed that the luteless purifier was the one which was coming forward. The idea of utilizing the lute as a safety-valve was quite uncalled for. Most of them had a safety-valve at the end of the condensers, in the shape of a tar overflow. He had an experience, not long ago, with the purifiers of the old lute form—a blow took place at the end of the condensers. He thought they could easily have their condensers in a safe place, where they could watch against any danger from escape. In this way, there were no need of a water-seal or a water-lute at the purifiers. One of the speakers referred to the valves of purifiers. He might say that he recently introduced a system in which they seldom changed the purifiers at all. In fact, with a luteless purifier they could do with an ordinary putty joint, because the purifier had only to be opened once, or at most twice, a year. If they could afford to put down with putty the doors of their washers, and condensers, and other parts, which were opened once a year, they could also afford to do the same with the purifiers. The trouble of the valves was overcome by very frequently changing them. Though they did not open the boxes, they changed the valves frequently. This was done in connection with revivifying. He found it was not advisable to run the revivifying arrangement to its extreme, because, so long as they had clean purifiers at hand, and put them in action early in the stage, giving them the first of the gas, and doing this frequently, they reached the same end, and the valve was kept in proper working order. Previous to their doing so, they had difficulty in the valve getting stuck, owing to the long period between the changes. He did not follow Mr. Yuill as to Bray's inverted burners. Perhaps he would let them know how he introduced them, whether in singles or doubles, in the lantern. It struck him as peculiar.

Mr. Yuill explained that he experienced no difficulty at all. They carried the inlet-pipe up one of the corners of the lantern in such a way as not to cause a shadow, brought it over to the centre, and turned it down. The globe was a fluted one, which gave a flood of light. There would be a difficulty in putting two inverted burners into one lantern, because there was not room for them; but there was no difficulty with single burners.

Mr. A. Waddell (Dunfermline) said he should like to have some more information about what was being done in the matter of vertical retorts. He believed that in more than one works in Scotland experiments had been made, with a view to the designing of such a retort. In oil-works they had been handling material for about 2½d. per ton, while in gas-works they had been paying a great deal more than this. He thought they should give more attention to this matter than they had been doing. As to carbonizing coal in bulk, they could not have the gas travelling through a thick mass of coal; they must get it into thin layers, and have a chamber where they could get the gases cracked up after they had left the coal. He hoped, however, those who had been making experiments would be able to tell them something more than they knew at present.

Mr. J. Kincaid (Kirkcaldy) said with regard to the introduction of stoking machinery, they in Scotland were always slow; but they now had this machinery introduced into moderate-sized works. Like everything else, it was a question of cost; and each one must decide for himself. In his case, he felt that if he were to introduce stoking machinery he should require about 20 more retorts than he had at present. His retorts were small, and the charges heavy. They could not get as much coal in as they did when they charged by hand; at least, if they got it in, it would

not be possible to get it out again. One effect of stoking machinery would be that they would be less at the mercy of the men than they were at present. Within the last few years, he had had, for the sake of peace, to concede more to the stokers than he felt inclined to do. One advantage of having stoking machinery would be that there would be fewer men to deal with, and men who would listen more to reason. Like other speakers, he thought that the annular type of condenser was a very bad one. In Kirkcaldy they were situated on the sea coast, and in the winter months their condensers were much too small. One day it might be hard frost but calm, and he could not get the gas cooled at all. Next day the temperature might be 15° or 20° higher; but if there was a current of air, he could get the gas down to the necessary degree. He would have to extend his condensers very soon; and he approved of the water-cooled plant. Distribution was engaging their attention more than ever it had done, as they had so much competition from other sources. He found that his unaccounted-for gas had not been coming down as he would like it to do, in spite of all his care. He had had experience of both the average meter and the governor system of checking the consumption of gas in the public lamps, and he considered the plan of paying for so many hours' burning, by governor, was really the most reliable one. Unfortunately, the lighting was not in his charge; but he would advise that burners should be more carefully tested, because he believed it would be found that they consumed more gas than they were rated for.

Mr. J. W. Carmichael (Barrhead) remarked that every gas manager could not introduce machinery; but where the make of gas justified its adoption, he believed it effected a saving. However, it was a matter which required consideration from all points of view. It should be the aim of every gas manager to bring down the cost of the production of gas; and if it could be reduced, by the employment of stoking machinery, by the aid of coke-handling plant, by improvements in purification, or in any other way, then, of course, they ought to adopt it. They had heard a good deal about condensation; and the suggestions regarding venetian blinds and so on made him think that they were feeling their way, to a very great extent—that they did not know the correct method to adopt. It had long been admitted that incandescent gas was the best kind of lighting, both for private and public purposes; but what was wanted at present was its practical application. It was easy to fit an ordinary burner, but everyone could not fit an incandescent burner; and the majority of the complaints they had were traceable to faulty fixing. He was glad to see that many gas companies and corporations were opening show-rooms, and training and employing men for putting up these burners and other fittings in connection with incandescent lighting.

Mr. W. Blair (Helensburgh) said he had had the pleasure of seeing the stoking machinery which the President had erected in his new works at Falkirk, and also that in the works at Alloa. They both did their duty admirably; and for works of 60 millions and upwards, he did not see why they should not be adopted. He thought they ought to be. However, he was looking forward to the vertical retort, because in his opinion there was greater simplicity in it than in the other. When they saw that two large works on the Continent had adopted it, it said a great deal for it. These retorts could be erected in works of any size, from 5 to 500 millions daily; the number of retorts in a setting all depending upon the size of the works. But the smaller units were, of course, much handier than the larger ones for putting on or off. As to condensation, he thought they might well take a lesson from their Colonial Canadian brethren, and have the condensing plant housed, as they would certainly have it under much better control. Part of it could be on the horizontal system—hung upon the walls, or otherwise. They ought to have their condensers in sections, so that they could regulate the operation. If they had one apparatus for (say) 100,000 cubic feet per day, and only had 10,000 cubic feet, how could they regulate it? Exhausters should certainly be of ample size, so that it would not be necessary to run the machines to death. An exhauster which was required to work from three to six months without stopping, should not be run at a high speed. A tar-extractor certainly should be applied to all gas-making plant before the gas entered either vertical or horizontal scrubbers—whether of the brush or any other type. Anyone contemplating the erection of new purifiers would never think of going back to the water-lute type. In the matters of cost and convenience in working, the luteless type were much handier. Everyone ought to have a safety-valve before the purifier. He was quite in sympathy with Mr. Yuill as to the inverted system of incandescent lighting. He had put into his retort-house a three-light inverted lamp; and it lighted the place admirably.

Mr. M'Lusky thought that when the President referred to what he described as interference with gas managers, he might have to protect him from the onslaught of the younger and the rasher members; but it would appear as if they had taken this part of the address, as he had, just as a little bit of argument, to give them something to talk about. One or two questions had been asked, which possibly he could reply to. There was the form of hurdle grids which had been introduced lately. The President had alluded to luteless purifiers; and Mr. Ewing had referred to the varieties of hurdle grids. They had no luteless purifiers in Perth, but they had hurdle grids; and from his short experience —over only a matter of five months—he could recommend them for purification with oxide of iron, but not where lime was used. They would see for themselves that if they were to fill the spaces with lime, it would be as difficult to get the lime out as it was to draw a tooth—the material would be so packed. Its own weight would pack it firmly. With them, however, they got 50 per cent. more material into the boxes, they had 50 per cent. more purifying surface, and 50 per cent. less air to expel when changing. With regard to what Mr. Vass had said about changing purifiers, he thought that, if they had an idle purifier, this was only waste of time; but perhaps he was under a misapprehension as to Mr. Vass's system of working. It was a most important matter. They should never contemplate the idea of a box standing idle. It was all very well if they were going to put their men into it to turn out the material; but if a box were to be allowed to rest, he did not see that they gained anything. As to the feeding of the scrubber with hydraulic main liquor, everyone who had had experience of washing and scrubbing—and particularly with the making up of liquor which was of any value for sulphate of ammonia—would understand that hydraulic main liquor was of no value in the washer or scrubber. Never mind what the text-books said; they were wrong upon this point. If they put the matter to the test, they would easily prove it. He had found that the Livesey washer was a very good machine. The Holmes mechanical brush scrubber, with a Livesey washer in front, seemed to be about as serviceable an instrument as anyone could have in a gas-works, large or small. He thanked them, on behalf of the President, for the very full and flattering discussion they had given to his address.

Mr. S. Mackay (Montrose) said he had been under a misapprehension in connection with Mr. Vass's system of working purifiers; and he hoped it would not be encroaching too much upon his time if he asked him to explain it.

Mr. Vass replied that his purifiers were four in number—three on and one off. This accounted for the reason why he could not use the one that was off. It was a dry-seal valve in the centre. They worked by introducing a quantity of air at the inlet of the condensers. This revivified the second box in particular when they were working the three. This box, however, soon became clean; and when it did so, their rule was to put on the one in front—the one that was idle; making it the first one. Then the one that was formerly the first received the air, after it went again through one purifier. The principle was that, in the presence of practically a pure gas, the air present had a revivifying action. This method was one which was introduced from America. The system worked very well. As a precaution, he might say they had an injector arrangement, to blow into the idle box, if at any time, through alteration on the works, or any other reason, more than one purifier became dirty, and they could not keep going on reversing the process. The other way, there was a percentage of air going forward into the gas; but this air did not get into the holder. A small percentage of nitrogen might get into the holder; but it would not act detrimentally upon the illuminating power of the gas. They might hear, in theory, that nitrogen in large volume would extinguish a light; but a small percentage, in a body of coal gas, had no appreciable action at all.

The President said his first duty was to thank them for the very full discussion they had given to his address. He was deeply indebted to those who had spoken for the friendly manner in which they had taken part in the proceedings.

Mr. M'Lusky proposed, and Mr. Ewing seconded, that Mr. J. W. Napier, of Alloa, be asked to act as President at the meeting next year.

Mr. Napier agreed to act.

Mr. Yuill proposed, and Mr. Vass seconded, that Mr. M'Lusky be appointed Convener of the meeting for another year.

The company afterwards dined together in the hotel—Mr. M'Crae in the chair. The toast of "Kindred Associations" was proposed by Mr. J. W. Napier, and was responded to by Mr. D. Easson, of Selkirk (Waverley Association), and Mr. G. Braidwood (Scottish Junior Gas Association).

Eastern Counties Gas Managers' Association.—We are informed by the Hon. Secretary (Mr. T. A. Guyatt) that at the meeting of this Association which will be held at Grantham on Wednesday, the 25th inst., Mr. J. W. Auchterlonie, of Cambridge, will read a paper entitled "A Few Notes on Inclined *v.* Horizontal Retorts Charged and Discharged by De Brouwer Machinery at the Cambridge Gas-Works."

North of England Gas Managers' Association.—We learn from the Hon. Secretary and Treasurer of the Association (Mr. Herbert Lees, of Hexham) that the 58th half-yearly meeting will be held at Newcastle-on-Tyne, on Saturday, the 28th inst., under the Presidency of Mr. Matthew Leaf, of York, the Secretary and Manager of the United Gas Company. Two papers will be read —one on "Comparisons in Gasholder Design, with General Notes on the Preservation of Structural Steelwork," by Mr. R. Nelson, of Hull; and the other, bearing the title of "Extracts from a Photometrist's Note-Book," by Mr. James Foreman, who is connected with the firm of Messrs. Alexander Wright and Co., of Westminster.

CYANOGEN RECOVERY AT THE AMSTERDAM (WEST) GAS-WORKS.

By D. Stavorinus.

(*Concluded from p. 41.*)

There have been many discussions in regard to the question whether the insoluble ferrocyanide is first of all formed, and the insoluble product dissolved at a subsequent stage by the action of the potash, or whether the soluble ferrocyanide is precipitated by the action of ferrous sulphide. According to Bueb's theory, the former takes place; but, in agreement with Kutten and Jorissen, I presume the latter supposition to be the right one. This is shown by the fact that ammonium ferrous ferrocyanide (Bueb mud) is not dissolved by caustic or carbonic alkali in diluted concentrations, and that only concentrated caustic alkali or milk of lime dissolves the product. As the washer liquor contains only carbonates, sulphides, and ammonia, a dissolving chemical action by these weak alkalines is not very probable. On the contrary, potassium ferrocyanide, when digested in solution with freshly precipitated ferrous sulphide, passes from the solution into the precipitate; the latter, after being thoroughly washed out, consisting to a large extent of potassium ferrous ferrocyanide ($K_2FeFe[CN]_6$).

The absorption of ammonia is a very important one, amounting as it does to about 1·2 to 1·4 grammes per cubic metre—*i.e.*, one-third of the total bulk of ammonia in the foul gas. This causes the cyanide washer to act also as an ammonia washer, as no further special washer is required for the washing of the gas; the action of the scrubbers being sufficient for the thorough elimination of the ammonia. The total quantity of ammonia dissolved in the washer liquor varies from 35 to 40 kilos. per cubic metre (220 gallons) of liquor, which corresponds to from 5·2 oz. to 6·4 oz. per gallon.

	Coal Carbonized per Day in Tons (1000 Kilos.).	Production of Gas per Day. Cubic Metres.	Cyanogen in the Gas in Grammes per Cubic Metre. Washer Inlet.	Cyanogen in the Gas in Grammes per Cubic Metre. Washer Outlet.	Total Quantity of Cyanogen Extracted from the Gas. Kilos.
(*a*)	449	135,580	3·7	—	503
(*b*)	351	133,200	3·5	0·10	453
(*c*)	353	137,220	3·7	0·10	494
(*d*)	327	94,905	3·8	—	360
(*e*)	347	100,575	3·1	—	312
(*f*)	328	98,325	3·0	0·05	296

	Cyanide in Washer Liquor, in Grammes per Litre. In Total.	Cyanide in Washer Liquor, in Grammes per Litre. In Clear Solution Only.	Ammonia in Gas (Grammes per 100 Cubic Metres.) Washer Inlet.	Ammonia in Gas (Grammes per 100 Cubic Metres.) Washer Outlet.
(*a*)	88	69	305	170
(*b*)	79	62	360	220
(*c*)	95	77	390	260
(*d*)	77	50	350	230
(*e*)	70	57	375	240
(*f*)	117	93	310	180

In the preceding tables, the cyanogen in the gas is calculated in the corresponding quantity of ferrocyanide. The total amount of ferrocyanide in the washer liquor varies between 12 and 6 per cent. Lower percentages very seldom occur. On an average, as may be seen from the first table, 99 per cent. of the total cyanogen in the gas is absorbed in the washer.

In practical work, the plant is operated as follows: For the preparation of the washer liquor, a solution of copperas is made, which is precipitated in the cold by the calculated quantity of sodium carbonate. The greenish-grey milky liquid resulting from the reaction is allowed to settle; and the mud of ferrous carbonate is separated from the clear liquor consisting of a solution of sodium sulphate. Very great care should be taken with regard to the perfect elimination of the sulphate by washing out the mud thoroughly, as the sulphate would cause great inconvenience in a subsequent stage of the process. During the washing out of the iron salt, some carbonic acid is set free. After the addition of potash, sufficient water has to be added to make the liquor contain about 10 per cent. of ferrous salt. As there is always some oxidation, the colour of the liquor becomes slightly brown. This liquid is pumped forward into a tank fitted with Herring machinery placed above the washer; and from the tank the liquor is allowed to flow into the washer. Though the system is arranged for continuous flow, the process is really intermittent—that is to say, two or three times a day a quantity of saturated liquor is drawn from the last bay (at the gas-inlet), and corresponding fresh liquor allowed to flow in. The amount of liquor corresponds to the quantity of gas treated, as for 2500 cubic metres of gas from 1 to 1·5 cubic metres (220 to 330 gallons) of liquor are calculated. Every day the working of the washer is checked by estimating the quantity of cyanogen in the gas at the inlets and outlets of the washer. The method employed for its estimation is that of Dr. Drehschmidt, using solutions of ferrous sulphate and caustic potash. The figures are given in the third and fourth columns of the first table.

The saturated washer liquor is treated and converted into ferrocyanide in the sulphate works; the first operation being the driving off of the ammonia. As already mentioned, 95 per cent. of the total ammonia is dissolved in a volatile form; and therefore a simple steaming in a modified Feldmann still is quite sufficient to take out all the ammonia which can be recovered in the form of concentrated liquor or as sulphate. After the erection of the plant, the ammonia was at first absorbed in a saturator with sulphuric acid, so as to form sulphate; but though the greatest care was taken, it was impossible to obtain a marketable product. Immediately after leaving the saturator, the sulphate was snow-white; but within a few hours, owing to the presence of a small quantity of ferrous cyanides, the colour became almost as dark as that of spent oxide. In order to get rid of the trouble, the ammoniacal vapours were condensed so as to form concentrated liquor, which was allowed to flow into a tank with the ordinary ammoniacal liquor. The sulphate prepared from these combined liquors in the ordinary way was never discoloured. The liquor, freed from ammonia, is then pumped forward into a filter-press, where it is converted into a clear solution and a cake—the former consisting of potassium ferrocyanide, potassium sulphide, and the surplus potash. This liquor is evaporated at a concentration of 30° Beaumé, which, in the process of cooling, throws down the crude salt as small cakes—potash and sulphide remaining in the solution. The separation of the crude ferrocyanide is very much favoured by the excess of potash in the solution.

As our investigations have shown, the solubility of ferrocyanide is considerably diminished when potash is present. At a temperature of 25° C., a concentrated ferrocyanide solution contains 27 per cent. of salt. This figure is decreased by 1·8 per cent. of potash to 13 per cent., and by 15 per cent. of potash still further to 2 per cent. At 100° C., a concentrated ferrocyanic solution contains 46 per cent. of salt; and 3 per cent. of potash decreases it to 38 per cent., 8 per cent. to 27 per cent., and 14 per cent. to 13 per cent. In practice, the mother liquors of the ferrocyanide crystallization contain 3 per cent. of ferrocyanide, and on an average 8 per cent. of potash. These mother liquors are mixed with fresh washer liquor and sent back to the washer. There remains the cake of the insoluble cyanogen compounds, together with the excess of iron sulphide. This cake is extracted by a strong solution of caustic potash. The cyanogen compounds $K_2Fe_2(CN)_6$ and $Am_2Fe_2(CN)_6$ are decomposed, potassium ferrocyanide is formed, and ferrous hydrate and ammonia are set free. This ammonia is also condensed; and the resulting pulp is pumped into a filter-press. The clear liquor is evaporated for crystallization; and the cake is stirred in the boiler with some water till it has become pulp, and then it serves again for use in the absorption process. It is very remarkable that a washer liquor prepared partly with cake-mud absorbs cyanogen better than fresh liquor without such addition.

It sometimes occurs that circumstances prevent the immediate breaking of the cake. In this case, it is of great importance to prevent the air coming too much into contact with it; for by the air the ferrous sulphide is regenerated to ferrous hydrate and free sulphur, and the latter causes the formation of ammonium bisulphide in the washer—

$$Am_2S + S = Am_2S_2$$

which in its turn allows sulphocyanides to be formed—

$$Am_2S_2 + AmCN = AmCNS + Am_2S.$$

Thus a loss of cyanogen is caused. The crude ferrocyanide obtained in the first evaporation is re-crystallized; and by hanging pieces of rope in the tanks, the pure salt is obtained in the form of crystal staves about a yard long, and weighing 10 kilos. The salt is almost chemically pure, containing on the average 99 per cent. of $K_4FeCy_6\ 3H_2O$, without any sulphocyanide or sulphate as impurities; the rest, 1 per cent., being moisture.

The financial results are not so good as were expected, owing to the slack cyanide market; yet fair profits have been realized, not only directly but indirectly. An important advantage is that there is no loss of ammonia, and that all that is absorbed by the washer liquor is totally recovered without any other expense than the price of the few pounds of steam required. As all the steam that is needed in our works is produced by means of Kudlicz grates, using breeze as fuel, the average cost is very low. As the cyanide washer absorbs one-third of the total bulk of ammonia, no further capital outlay is needed for washing the gas. As to the chemical products used in working the process, the cost of these is as low as possible; for by the frequent use of the mother liquors and the cake, the consumption of potash and iron is only just as much as is needed for the formation of the ferrocyanide molecules. Per metric ton (1000 kilos.) of ferrocyanide, theory requires 145 kilos. of iron = 660 kilos. of ferrous sulphate; while the working figure is 690 kilos. As to potassium, the theoretical figure of 346 kilos. is not very different from the practical result—that is, 360 kilos. for potash and caustic alkali. The force required for turning the washer is calculated at about 2-horse power. The washer acts very satisfactorily; having a capacity equal to 100,000 cubic metres of gas per day, and dealing with 140,000 cubic metres without any loss of cyanogen, and with no more loss of pressure than 10-10ths as the maximum.

This method for the recovery of cyanogen is, I think, a suitable one for those gas-works in which the production is sufficient to render remunerative the conversion of the cyanide liquor into marketable ferrocyanides. In such a case, I should myself prefer it to all other systems. When, however, the saturated washer liquor has to be sold, the method compares unfavourably; the

loss of potash and iron salt, and partly also of ammonia, reducing the profits considerably. The latter reason certainly prevents the Knublauch system from being adopted so generally as it deserves. In this respect the Bueb system has the advantage.

Many modifications in the application of the system have been proposed by different chemists, in order to render it more economical in working; but up to the present they have been unsuccessful. I have myself proposed to omit potash in the washer liquor; thus combining the Bueb and Knublauch systems. Shortly recapitulating the prominent advantages of the modified Knublauch system, there is no loss of ammonia, potash, iron, or cyanogen; there are no waste products, but an almost chemically pure product is formed at a low rate. As to the conversion of the nitrogen in coal into gaseous nitrogen compounds, investigations have shown that all such compounds—be they ammonia or cyanogen—are formed only in the later stages of the carbonization process, and that the chemical action is finished by a development of elementary nitrogen. The formation of ammonia has to be regarded as the result of chemical action between the nascent hydrogen and nitrogen. The formation of cyanogen is a secondary reaction taking place between the ammonia and the carbon. The results obtained at Amsterdam are as follows: 0·876 kilo. of potassium ferrocyanide per metric ton of coal carbonized, and 3·050 kilos. per 1000 cubic metres of gas—the latter being equivalent to 1·92 lbs. per 10,000 cubic feet.

PROFESSOR LEWES ON FIRE EXTINCTION.

In the two preceding issues of the "JOURNAL," we have noticed three of the Cantor Lectures which have lately been delivered at the Society of Arts by Professor VIVIAN B. LEWES, F.I.C., F.C.S., on the subject of "Fire, Fire Risks, and Fire Prevention." It now only remains to deal with the fourth, with which the series concluded on Monday last week.

In his introductory remarks, the lecturer briefly reiterated the chief points of his previous discourses. He showed that in order to create fire we must reach the ignition-point of a combustible body in the presence of oxygen; while to carry on the fire the supply of this gas must be continued, and the temperature maintained above the point of ignition—a failure in either of these requirements causing extinction. He also reminded his audience that most fires have small beginnings, and are so easily dealt with in the earlier stages that, unless they are given time to gather force, their extinction is readily compassed. It is this latter factor which is the most valuable asset in what is known as fire prevention, but which is really "fire restriction." We must have fire; but we must have it under control—must limit its actions to our requirements. We can only do this by, as far as possible, removing it from contact with anything on which it can feed, and prevent it spreading from the area in which we are utilizing it; or if it should so stray, by having the means of dealing with it before it gets out of control. With the object of preventing fire, enormous sums have been spent in the erection of what are called, with grim humour, "fireproof" buildings, the absolute inutility and absurdity of which have been fully demonstrated by some of the very biggest fires of modern times. This disastrous state of things had, he remarked, been brought about by a complete misconception of what was really required to check the spread of fire, and a bemuddled confusion of the terms "fireproof" and "fire-resisting."

The lecturer then proceeded to deal in detail with the fire-resisting properties of the various materials used in buildings. Starting with the statement that no material that could be practically employed was "fireproof"—that was to say, had the power of resisting the action of heat without undergoing a physical or a chemical change—he showed that granite and sand crack and fly under its influence; that limestone, even at such moderate temperatures as 800° C. (1472° Fahr.), decomposes, and yields lime; that bricks fuse, and so do iron and steel. The result is that at the fierce heat engendered by a big warehouse fire, the most refractory materials prove to be of little resistant value, while the methods of construction employed make them an active danger. Professor Lewes recounted his experience at the great fire in Cripplegate in 1899, and criticized the "iron, steel, and concrete" method now adopted for large warehouses. He said that in erecting a fireproof building, what should be aimed at is to so make it of fire-resisting material that a fire accidentally started shall have little or no danger of spreading, and that the maximum time should therefore elapse before the fire has assumed dangerous proportions. In choosing materials for the construction of such buildings, therefore, the two great points are the selection, not of "fireproof" materials, which it is practically impossible to find, but of "non-flammable" materials which are incapable of spreading a fire, and which are themselves non-conductors of heat. Taking the conducting power of iron as 100, brick would be about 6, timber 3, cement 2. If it were possible to render timber non-flammable, it would be superior to practically all other material except cement, which, of course, could not be used alone.

The reference to timber led the lecturer to mention the various methods which have been tried to treat it for the purpose of making it resist fire, and to explain the cause of their failure. He, however, described a process which resulted in the production of a non-flammable wood which he characterized as "perfect building material." He said that if the apathy of the public and the greed of the speculative builder combined to prevent wood so prepared having the universal adoption it deserved, its use should be enforced in all new hotels, public buildings, and places of entertainment, where it would afford more protection in case of fire than the multiplication of exits could ever do. It was the cost that militated against the introduction of improvements; but in the case of large buildings the increase on the gross outlay would be so small as to make it almost a duty to adopt a measure that was not only for one's own safety, but for the good of the community at large. In buildings to be used as stores for inflammable goods, subdividing the floors into compartments of reasonable size was a great help in fighting a fire; but for works where no large stock of such material was kept, restrictions as to size were vexatious and unwise.

Professor Lewes now came to the means of extinguishing fire when it has once been started; and he said this could be done either by lowering the temperature of the burning mass below the point necessary for the continuance of the combustion, or by cutting off all access of air, and so depriving the combustion of the oxygen necessary for its support. To the first method belongs the pouring of a large volume of water upon the fire. This brings into play several actions, which the lecturer explained; the first being the lowering of the temperature below the ignition-point. But although water will extinguish a fire, a certain amount of discretion is necessary in its application; otherwise unexpected results may happen, such as the formation of large volumes of inflammable gas. In order to avoid their generation, the water must be directed on to the top of the burning material first, so that it cools the glowing carbon downwards, yielding the minimum quantity of inflammable products. A fire can also be extinguished by practically smothering it—cutting off all access of air. In the case of burning oils, water is of little use. Mould or sand, or anything that will keep the air away, and so smother the fire, is much better. Certain gases—such as carbon dioxide, sulphur dioxide, hydrochloric acid gas, and ammonia—which will not support combustion, have been utilized for the extinction; but Professor Lewes said that unless the whole of the surrounding atmosphere could be charged with the gas, little or no good would result. His own experiments led him to believe that the most effective of the many solutions that could be used for the purpose of fire extinction was one of sodium sulphate and ammonium chloride in molecular proportions. When this was thrown upon a hot fire, sulphur dioxide and ammonia were set free, while salt was formed which glazed the embers. "Extincteurs" and hand-grenades had proved very useful for domestic purposes, and while fires in an enclosed place were in their early stage. But they were worthless when once a fire was raging fiercely and forming a strong up-current. Other appliances described by the lecturer were sprinklers and automatic alarms.

In conclusion, the lecturer expressed regret at the limitations which time had placed upon his treatment of his subject. He could only hope that the labours of the Fire Prevention Committee might tend to bring home to the British public how much remained with them to do for the protection of their homes and trade interests. He said that if only the London County Council would, through their Fire Brigade and Technical Education Committees, popularize the subject of fire prevention, and make the public see the importance of the matter to themselves and the community at large, the enormous tax in lives and property now exacted by the fire fiend could soon be reduced to a very large extent.

Professor Lewes was very heartily applauded at the close of the lecture, and a cordial vote of thanks was passed to him.

A Massachusetts Report on the Sliding-Scale.—On the 25th of May last year, the Legislature of Massachusetts authorized the Governor to appoint, with the advice and consent of the Council, two persons—citizens of the Commonwealth—who should serve with the members of the Board of Gas and Electric Light Commissioners as a Committee to consider the automatic and interdependent adjustment of the price of gas to consumers, and the rate of dividends to the share and stock holders of gas companies under the sliding-scale as in operation in this country—keeping in view the expediency or otherwise of applying it to the Gas Companies in Boston and Brookline. Acting on this resolution, Messrs. James E. Cotter and Charles P. Hall were appointed to serve with the members of the Board of Commissioners; and a visit of considerable length was paid to London and other cities and towns in Great Britain and Ireland. The Committee in their recently issued report acknowledged the courtesy shown them, and put it on record that "the liberal and unrestrained manner in which everyone placed at the Committee's disposal knowledge and experience, was of incalculable value." The report goes into the matter of inquiry, having regard to its size, in a most exhaustive manner; the conclusion arrived at by the majority of the Committee being that, to adopt the sliding-scale in Massachusetts, "certain fundamental principles on which the present laws and policy of the Commonwealth rest must be abandoned." There is a minority report, signed by the two citizens named, advocating the adoption and application of the sliding-scale. A more extended notice of the report will be given.

WATER-GAS PLANT AT TRIESTE.

The published minutes of the proceedings of the 34th annual meeting of the Italian Gas Society, which was held in Genoa last year,* contain an interesting description of, and report on, the water-gas plant at the municipal gas-works at Trieste. As the plant adopted is in some respects of an unusual kind, being an attempt to combine the advantages of both the Dellwik or benzol system and the Lowe or carburetted water-gas apparatus, we give all but a full translation of the paper. The author of it is Sig. E. Sospisio, who is the Engineer-in-Chief of the Trieste Gas-Works.

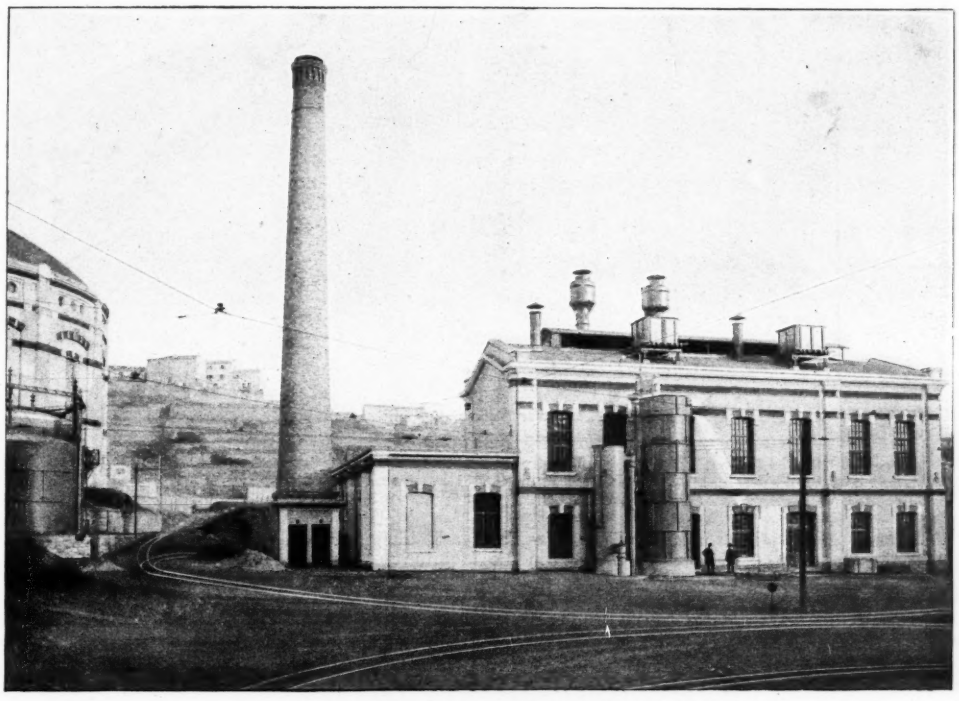


Fig. 1.—The Buildings for the Water-Gas Plant at Trieste.

The continued and growing consumption of gas at Trieste owing to the increasing population of the city, the extension of heating and illuminating by gas, added to the need of diminishing the production of coke (the supply of which exceeded the demand, and so reduced its market value), induced the Municipal Council of Trieste to consider the construction of works for the manufacture of carburetted water gas. This involved the careful study of the different systems, so as to choose the best possible method of carburetting to be adopted. The fortunate combination of circumstances in having at Trieste a refinery of mineral oils, from which all the residuals of the distillation of petroleum could be obtained at a fair price, and the cost of benzol being equally reasonable, caused some difficulty in the choice of the system to be adopted, because the price of the carburetting material, being given, the cost of gas manufactured would be about the same with either the one system or the other. Taking the whole situation into consideration, the Council decided not to tie themselves to any particular system, but to choose a method of carburetting which could at any moment be conveniently adapted to the necessities of the time being. From these considerations naturally sprang the condition that whatever system was chosen would have to be capable of being used without any difficulty for carburetting either with mineral oil or with benzol.

The different systems actually in use for the production of water gas which would correspond more or less satisfactorily to the scope laid down, were the Lowe, the Dellwik-Fleischer, and the Strache. All three were originally designed for a special purpose—that is to say, Lowe's for carburetting with oil, and those of Dellwik and Strache more particularly for the production of pure water gas, to be carburetted or not with benzol. All had inconveniences, if it was intended to use them at the same time in the two methods. The preferable system to adopt would have been that for the production of pure water gas—or "blue" gas, as it is called—and then to carburet it separately on the Peebles system for carburetting with mineral oil, or on that of Leybold for carburetting by benzol. This last-named system would have been the most satisfactory for obtaining perfect carburetting with a minimum of oil; but it had the disadvantage of its apparatus being considerably more costly, and of necessitating larger and more expensive buildings, besides the inconvenience of always having to keep the carburettors in use, and of being less adaptable to prolonged shutting-down and intermittent working.

These reasons led to the adaptation of the Dellwik-Fleischer system to that of Lowe, in order to have a complete plant corresponding to the requirements of the works. With the apparatus at Trieste, which differs from any other water-gas plant up to the present, it is possible to make: (*a*) Pure water gas, to be used for self-carburetting or with addition of benzol; (*b*) water gas

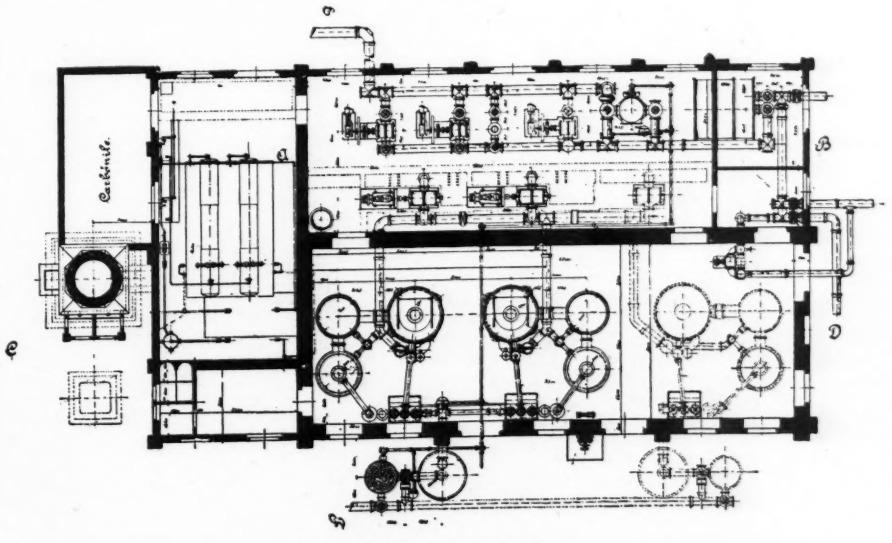


Fig. 2.—Plan of the Water-Gas House.

* See "JOURNAL," Vol. XCI., p. 170.

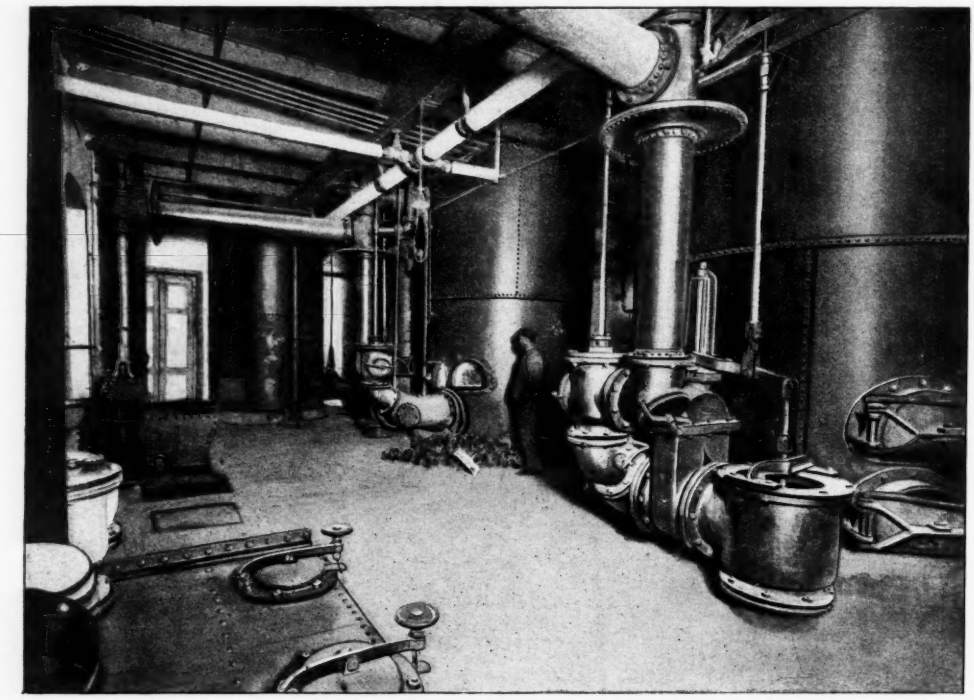


Fig. 3.—The Lower Floor of the Generator House.

carburetted with oil, to be mixed directly with illuminating gas. For making pure water gas, an ordinary Dellwik producer is used, to which, for carburetting with oil, is added a Lowe carburettor and superheater.

In the two different systems for the production of water gas, the generator remains the same, except for some alterations in the working and in the manipulation of the valves so that the blue gas produced is carried through the carburettor-superheater or directly to the mains. The Trieste plant, with the two producers now built, can make 24,000 cubic metres (847,600 cubic feet) of pure water gas per day, and 30,000 cubic metres (1,059,500 cubic feet) of carburetted water gas. By adding a third section, the daily production would amount to 40,000 cubic metres (1,412,660 cubic feet) of pure water gas, and 50,000 cubic metres (1,765,830 cubic feet) of water gas carburetted with oil. The buildings were erected for a complete plant of three sets, and cover, with the space for the boilers, machines, manufacturing apparatus, baths, and mess-rooms for the workmen, but excluding the purifiers, a superficial area of only 520 square metres (622 square yards); an area much smaller than would be needed for coal-gas plant for the same make, which would require at least 2000 square metres (2392 square yards) for the furnaces, exhausters, and meters.

The plant, which is shown in figs. 1 and 2, is composed of a building in two bays, in one of which are the generators and carburettors with their accessories, and in the other the steam boilers, fans, and their engines, exhausters, Drory condenser-washer, and station meter. The generator building is divided into two floors by a working platform. Fig. 3 shows the lower floor, in which are placed the valves for controlling the generators, the mains, and a superheater. Fig. 4 shows the upper working floor, where all the operations for making and carburetting the gas take place (with the exception of the clinkering of the producers), as well as the manipulation of the air, gas, and steam valves. The supply of coke for the production of the water gas is effected by means of an elevator worked by an electric motor, which elevates the coke from the yard to two hoppers placed near the generators, from which hoppers it falls into special trucks running on the working stage, and so is carried to the charging doors of the

Fig. 4.—The Upper Working Floor of the Generator House.

generators. The storage capacity of the hoppers is sufficient for 14 to 16 hours' service for each generator.

Fig. 5 shows a part of the machine-room, and in this are seen two fans directly coupled to high-speed vertical steam-engines. Owing to the different speed required, according as to whether the Dellwik or the Lowe system was being operated, it was necessary to give particular attention to the two steam-engines, and to construct them with special governors, by which it would be possible to make the desired variations in the number of revolutions. The engines having, then, to be controlled from a distance—that is, from the working platform—and having to start from whatever the point at which the driving-shaft happened at the time to be, are composed of two compound cylinders, with a distributor for each cylinder and levers at 90°. By these means the workman employed in making the gas regulates the running of the engines—starting and stopping them without the aid of the attendant who cleans them. The two exhausters placed in the machine-room serve to pump the gas from the compensating gasholder, and send it to the Coze retorts for self-carburetting, if it is carburetted water gas, in which case the latter passes through a Drory condenser-washer placed in the same room, the function of which is to abstract the tar carried by the gas and formed by the gasification of the oil. A safety-valve between the inlet and outlet pipes of the exhausters prevents any possible damage to the compensating gasholder in case of excessive suction.

Before going to the inclined retorts and on to the purifiers, the water gas has to pass through a meter for registering the quantity produced. If it is considered necessary to make the carburetted gas richer than usual, this can be done by placing a Leybold carburettor in the meter-room of the coal gas, and by this means to enrich the mixed gas by adding the needful quantity of benzol. Two Babcock and Wilcox boilers, each of 100 square metres surface, complete the plant. They are provided with superheaters to increase the temperature of the steam to 300° C. (572° Fahr.), and with an economizer. There is provided a steel plate tank of 200 cubic metres (44,000 gallons) capacity for storing oil, with rotary pumps, worked by an electric motor, for pumping the oil from the tank-waggons into the hopper; also a compensating gasholder of 500 cubic metres (17,660 cubic feet), prepared for telescoping, when its capacity will be 1000 cubic metres (35,320 cubic feet); and different pumps for water and tar for the service of the condenser and scrubber.

Where pure water gas for self-enriching is made on the Dellwik system, the gas is pumped from the compensating gasholder by an exhauster, and sent first to the meter and then to the retorts, where it gets mixed in the upper part of the inclined retorts for about two hours. The quantity intermixed in each retort is determined by a slow-gauged regulation of the stopcock, which is connected to the mouthpiece of each retort, as seen in fig. 6. These inlet-cocks are of special make, and are also provided with needles for the purpose of overcoming any stopping up which might occur in the gas-inlet mouth. At the end of each bench of retorts is a collecting main, which supplies the pipes distributing the water gas to the different retorts of the bench; and at the point where this pipe crosses the collector, there is placed a special safety box to prevent possible explosions.

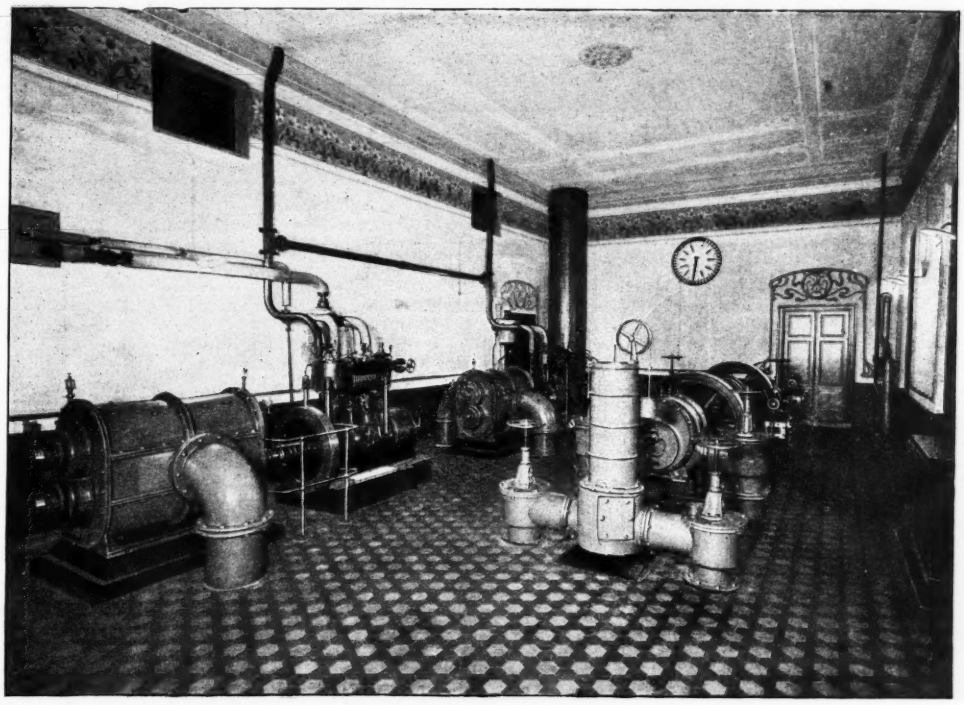


Fig. 5.—The Machinery Room.

In designing such plant as this, one endeavours to be careful of every detail, so as to obtain the best results in working. The cost of the plant (which was erected as it is in only six months) was about 90,000 lire (£3600) for buildings, excavating, foundations for the engines, chimney &c., and 310,000 lire (£12,400) for machinery, mains, holder, &c.—total 400,000 lire (£16,000).

As soon as the plant was finished, the tests were begun. These proved very interesting, on account of the three qualities of gas which could be produced; and notwithstanding that the tests were made with great care, and under conditions approximating to those of ordinary working, the results were above those contracted for. The first test was conducted with a view to find out the quantity and quality of the pure water gas produced, and the relative consumption of material. In this test, which lasted eight hours, each producer made 600 cubic metres of gas, with a consumption of 1 kilogramme of coke for every 2·07 cubic metres of water gas produced, or, deducting ash and cinders, 2·32 cubic metres per kilogramme of carbon used. The water gas produced was of the following composition:—

	Per Cent.
Carbonic acid (CO_2)	= 3·5
Oxygen (O)	= 0·2
Carbonic oxide (CO)	= 40·7
Hydrogen (H)	= 48·8
Methane, nitrogen, &c.	= 6·8

Its theoretical calorific power, found by a Junkers calorimeter, was 2839 calories, and its specific gravity 0·564 (air = 1·000).

The second series of tests was for the purpose of finding out the effect of the self-enrichment of the water gas. This could not be investigated so thoroughly as was desired, owing to the lateness of the season, and because only one-half of the retorts provided with the necessary accessories, were at disposal. However, the results obtained, and shown in the first table next page, are above those guaranteed, and are such as to encourage one to make a more exhaustive study of this much-debated question. The illuminating and calorific powers of the coal gas in the experiments shown in the table were not ascertained in some of the tests, for various reasons; but it may be said that the average was at least 13 candles and 5300 calories.

Another series of experimental tests was begun with the object of establishing data for the production of water gas carburetted with mineral oil (the residue of the distillation of petroleum). As in the preceding tests, so in this test of eight hours, it was sought to maintain as much as possible the ordinary conditions of working. The following were the results obtained: Carburetted water gas produced per hour at a pressure of 765 mm. and 211° C., 752 cubic metres of 15-candle power and a theoretical calorific power of 5000 calories, of a specific gravity of ·617, and of the following composition:—

	Per Cent.
Carbonic acid (CO_2)	2·4
Oxygen (O)	0·2
Carbonic oxide (CO)	32·2
Heavy hydrocarbons (C_nH_n)	8·3
Methane (CH_4)	13·6
Hydrogen (H)	36·9
Nitrogen (N)	6·4

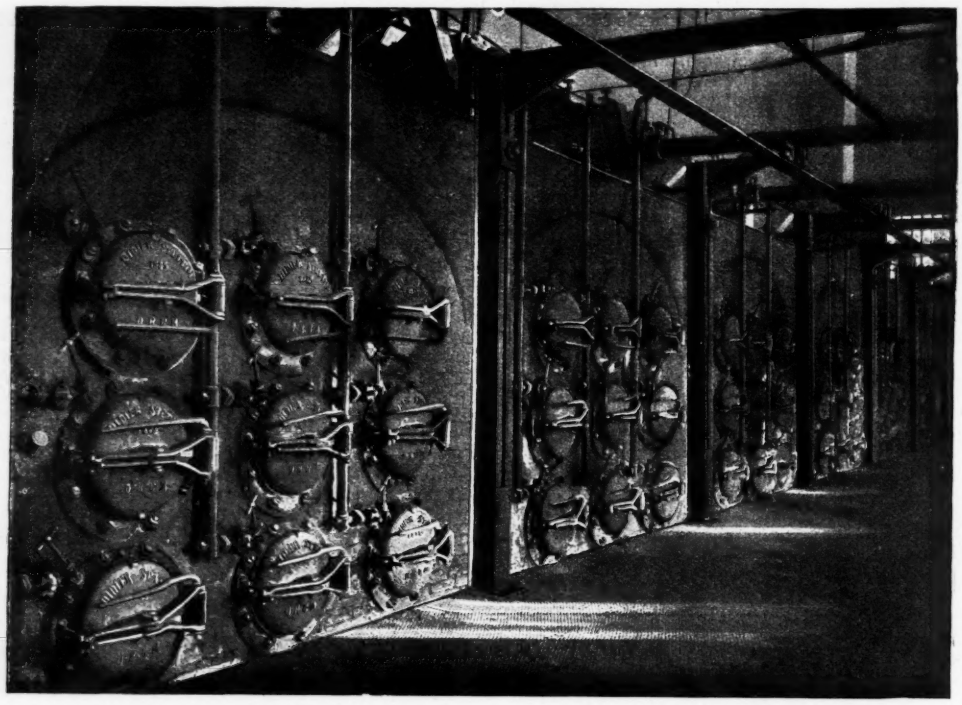


Fig. 6.—The Arrangement for Mixing the Water Gas at the Upper Part of the Inclined Retorts.

Date.	Duration of Test.	Production of		Water Gas sent to		No of Retorts Constantly in Service for Self-Enrichment.	Proportion of Water-Gas in		Benzol used per Cubic Metre of Pure Water-Gas.	Illuminating Power in Hefner Candles.		Calorific Power.	
		Mixed Gas.	Water Gas.	Inclined Retorts.	No. of Retorts.		Self-Enriched Gas.	Mixed Gas.		Coal Gas.	Mixed Gas.	Coal Gas.	Mixed Gas.
	H. M.	Cub. Met.	Cub. Met.				P. Ct.	P. Ct.					
Nov. 8 . . .	7 0	14,114	1290	8	72	24	18·0	9·0	None	12·9	11·2	5338	5121
,, 9 . . .	8 0	14,250	1950	10	90	30	19·5	13·6	,,	..	10·6	5257	5100
,, 10 . . .	9 30	20,100	2463	10	90	30	20·5	12·2	,,	..	10·6	..	5142
,, 11 . . .	9 40	19,310	2540	10	90	26	27·3	13·1	,,	..	12·4	..	5299
,, 12 . . .	8 0	16,180	2313	11	99	33	26·2	14·2	,,	..	12·4	..	5265
,, 14 . . .	8 0	18,220	4774	12	108	72	49·6	27·8	24 gr. Max.	13·2	10·3	5380	4987

For the production of a cubic metre of gas, 0·514 kilo. of coke and 0·349 kilo. of oil were used. The oil employed for carburetting the gas had the following characteristics:—

Flashing-point	150° C.
Specific gravity	0·8953
Calorific power about	10,500

In these experiments we also ascertained how much steam was necessary for producing water gas, and how much water was needed for circulation in the condenser for cooling the gas. From all these experiments, it was found that the production of a cubic metre of carburetted water gas required—

	Grammes.
Coke	514
Carbon (including water and volatile matter)	461
Oil for carburetting	349
Steam for generator, exhauster, and two small pumps	780
Circulating water	1540

The last test every day was to verify the material necessary for carburetting mixed gas with benzol, when the mixture of coal gas and water gas was effected after the exhausting and washing plant in the proportion of 20 per cent. of water gas and 80 per cent. of coal gas. For this mixture, the Berlin Anhaltische-Machinenbau-Actien-Gesellschaft guaranteed a consumption of benzol not exceeding 70 grammes per cubic metre of water gas used to obtain a gas of 15 candles and of a theoretical calorific power of 4700 calories, provided the coal gas was of a calorific power not less than 5200 calories. This test was made at a very favourable time, and, in spite of abundant condensation in the carburettor, which prevented all the benzol being evaporated, the consumption of 70 grammes was not reached, and the gas produced had a higher illuminating power than 15 candles.

Without wishing to lessen the value and utility of the experimental tests, which in general afford some guidance as to the quality of the machinery supplied by contractors, they always show better results than those obtained in practical working, because at the the time of testing, however great may be the care taken to make the tests approximate to the conditions arrived at in practice, yet these conditions are never actually obtained. Moreover, in tests, there is new machinery specially regulated, always working under vigilant and intelligent supervision, and the machines run at full charge, which is hardly ever the case in actual working. In tests, in short, the very important element of the fuel required to bring the machines to a normal condition is overlooked. In order not to neglect any unfavourable factor, nor any adverse influence, and to have more reliable data, the basis should be the results obtained from as long a period of working as possible. For this reason the results of five months' working of the Trieste plant are given, during which we had to overcome

Month.	Working Hours.	Gas Made.	Cost of Manufacture for									
			Coke.		Coal for Steam.		Oil.		Maintenance and Repairs.	Miscellaneous.	Labour.	Total.
		Cub. Metres	Kilos.	Lire.	Kilos.	Lire.	Kilos.	Lire.	Lire.	Lire.	Lire.	Lire.
January	519	297,400	198,170	5,548·76	96,640	1778·19	119,760	6,287·40	1387·93	562·69	1049·00	16,613·97
February	462	313,000	207,650	5,814·20	66,600	1332·20	101,930	5,351·32	926·08	530·91	1132·50	15,087·21
March	391	280,800	194,530	5,446·84	63,610	1295·84	93,840	4,926·60	1197·44	588·81	1216·75	14,672·28
April	248	199,200	138,300	3,872·40	32,870	802·02	70,030	3,676·57	372·70	314·68	798·80	9,837·17
May	278	217,000	146,670	4,106·76	34,100	693·45	77,650	4,231·92	328·70	373·19	710·90	10,444·92
Totals	1898	1,307,400	885,320	24,788·96	293,820	5901·70	463,210	24,473·81	4212·85	2370·28	4907·95	66,655·55

NOTE.—In these prices, no account is taken of the value of the tar obtained from the distillation of the oil, which was approximately 20 to 25 per cent. of its weight, and very nearly of equal value to that of the tar from the coal.

the difficulties that are inevitable on the introduction of any new plant. At Trieste, however, they were not many; the principal being to find the means of thoroughly cleaning the fire-bars of the generators, and the separation of the tar and oil from the condenser water. In the distribution service, the only inconvenience which showed itself was that with the mixed gas; it being rather denser—namely 0·445 sp. gr. instead of 0·358 sp. gr. The Auer burners, which were regulated for the latter specific gravity, burnt less satisfactorily; and the mantles were not incandescent all over, thus needing particular care.

The results presented in the second table on p. 114 have only an absolute value for Trieste. In different localities the price of manual labour varies, and more especially the price of raw material; but they will serve as a base for a comparative study of the usefulness of installing works for the production of water gas.

The price at which the coke used in the working was taken was 28 lire per ton; that for oil, 52·50 lire per ton; and the steam coal used had from 15 to 16 per cent. of ash, and was a mixture of coal, briquettes, and coke dust, which, in practical working, with first-class boilers, evaporated about 6·30 kilos. of water per kilogramme of fuel.

In regular normal working, the number of men employed for every squad was as follows: One labourer for gas making, one stoker for the boilers, one attendant for the steam-engines and exhausters, one coke carrier, and one boy for cleaning purposes, for only eight hours each day. During the months of January, February, and part of March, three squads were in service; during part of March and April, two squads per day; and in May, one squad only. From the above table, the results obtained show that the cost, without interest and sinking fund, per cubic metre of carburetted water gas was as follows:—

For coke	0·018,960 lire
,, steam	0·004,514 ,,
,, oil	0·018,719 ,,
,, maintenance	0·003,223 ,,
,, miscellaneous	0·001,812 ,,
,, labour	0·003,755 ,,
Total	0·050,983 lire per cubic metre.

The consumption of material per cubic metre of gas made was—

Coke	0·6786 kilos.
Coal for steam	0·2236 ,,
Steam for all purposes	1·4086 ,,
Oil	0·3540 ,,

During these five months of working, besides the direct advantage of lessened cost in the manufacture of water gas as compared with coal gas, there was the further indirect advantage that we were able to maintain our beds of retorts always completely charged, regulating the variations in the consumption of gas by means of our water gas. Comparing the working results of the coal-gas retorts for the first five months in 1904 with the corresponding months in 1905, we find that in 1904 we made 364 cubic metres (12,855 cubic feet) per retort per day, and in 1905, 370 cubic metres (13,067 cubic feet); being an increase of 1·65 per cent. This increased production in 1905 is equivalent to a saving of 576 days of working one retort, which corresponds to an economy of one bed of nine retorts for 64 days. The cost of this latter is—

For fuel, 850 kilos., at 28 lire per ton	23·80 lire.
,, labour	13·80
,, repairs	8·30
Total	45·90 lire.

or (say) 36s. 9d. So that the saving in this respect per cubic metre of water gas made was 0·00224 lire.

The approximate average composition of the mixed gas sent out from the Trieste Gas-Works during these five months was—

Carbonic acid (CO_2)	1·8
Heavy hydrocarbons (C_nH_n)	5·8
Oxygen (O)	0·4
Carbonic oxide (CO)	11·5
Hydrogen (H)	48·2
Methane (CH_4)	28·2
Nitrogen (N)	4·1

The theoretical calorific power was 5200 calories; and the illuminating power, 13½ to 15 Hefner candles.

Conversion of Canal-Boat Gaugings to Standard Tons.

We have received from the "Iron and Coal Trades Review" a "Table of Constants for the Conversion of Canal-Boat Gaugings to Standard Tons," by Mr. S. L. Thacker, M.Inst.M.E., by means of which the actual weight carried on canal-boats can be easily and rapidly ascertained. One of the disadvantages of canal traffic has hitherto been the irregular and unsystematic manner of ascertaining the actual weights carried—the methods and gauges varying in different localities, and the actual weight being ultimately estimated by a species of guesswork more or less accurate according to the experience of the boatgauger. By the use of this table, however, the size of boat and the net gauge in inches being known, the actual weight can be ascertained by a simple multiplication—correct to 5 cwt. The publication will prove of value to engineers and others, as it will enable them to keep a check on such portion of their sales and purchases as is carried by canal.

ISLE OF WIGHT GAS ASSOCIATION.

The Second Annual General Meeting of the Association was held at the Ventnor Gas-Works on the 31st ult.—Mr. J. S. Ineson, the Engineer, Manager, and Secretary of the Ventnor Gas and Water Company, in the chair. The members were welcomed by Mr. Littlefield, one of the Directors of the Company.

The business was opened with the reading of the minutes of the previous meeting by the Hon. Secretary (Mr. E. H. Millard, of Cowes), which were confirmed. The Chairman then addressed the members; and his remarks were well received. The report of the Management Committee and the accounts were next submitted. The former opened with congratulations to the various Boards forming the Association, on the continued prosperity of the gas industry, both in the Isle of Wight and generally. The Committee were able to make a satisfactory contract for the supply of tubes and fittings; and they recommended its continuance. The work of the Association with regard to coke resulted in improved returns being obtained for this residual. The question of insurance for third-party and workmen's compensation was discussed by the Committee; and in some cases a reduction in the premiums paid was obtained. The members had an enjoyable excursion meeting to the New Forest, on the invitation of Mr. Gilbert, the Chairman of the Brading Harbour Gas Company. The Committee recorded with regret the loss of a colleague, caused by the departure of Mr. H. J. Ibbotson, the Engineer of the Newport Gas Company, to Japan. The Association recognized his good work on the Committee by presenting him with a dressing-case at a complimentary dinner, and by electing him an honorary member of the Association. His brother (Mr. S. W. Ibbotson), who has been appointed Manager at Newport, succeeded him on the Committee. Several matters of minor importance received attention, and much good accrued from the visits to the various works. In the period covered by the report (the nine months to Dec. 31), four general and two Committee meetings were held. The accounts showed a small balance in hand. The Committee were all re-elected, as were also the Hon. Secretary and Treasurer (Mr. Millard) and the Auditor (Mr. Halliday).

Among the general business of the meeting, may be noted the acceptance of a tender for wrought-iron pipes and fittings. The prices submitted for compo. pipe were considered too high; and the members deferred making a contract. The price of coke was discussed, and a minimum figure fixed for its sale to merchants. In view of the high price of Durham coal, several cargoes of Yorkshire coal were ordered. It was decided to hold the next meeting at Shanklin in May.

At the close of the business, the members were entertained at tea by the Directors of the Gas and Water Company.

MAKING A GASHOLDER TANK SOUND.

The appearance of the note which was abstracted, in the "Journal" for Jan. 13 (p. 430), from the "Journal für Gasbeleuchtung" has brought a further communication to our contemporary upon the same subject; the author this time being Herr V. O. Keller, of Buda-Pesth.

The tank which gave him trouble was one belonging to a three-lift holder of 3¾ million cubic feet capacity, erected in 1892 at Zwischenbrücken, near Vienna, and at the time the largest holder on the Continent. Within about a year of its completion, the tank began to leak; and on examination a roughly vertical crack was found in its walls, descending for a distance of 12 feet from the upper edge. The tank was built in earth composed of blue marl and loose sand; and as the level of the ground-water was subject to serious variations, the sand was periodically being washed away in places—leaving such cavities in the soil that it was no longer able to resist the outward pressure of the tank. Hence, though the crack mentioned was easy to repair, it was felt that there was no security for the future behaviour of the tank, unless the ground round it could be fortified.

For this purpose, the author fitted up an apparatus for preparing and injecting a cream of cement mortar. A horizontal steel cylinder with convex ends (something like a small steam-boiler about 3 feet long) was provided with a set of paddle agitators carried on a horizontal shaft terminating in a hand crank at one end. At the top of the vessel was a manhole for the insertion of the cement, &c., and a 1¼-inch cock for admitting compressed air from an injector or pump. At the bottom was a 1½-inch cock for the outflow of the cement cream. The boiler was charged with two parts of cement, 1 part of sand, and a sufficiency of water. The air was turned on, the agitator put and kept in motion, and, when everything was ready, the outlet-cock was opened smartly, driving the paste at a pressure of 3 or 4 atmospheres through pipes into holes in the ground made in the following manner: A length of stout 2-inch barrel was fitted with a pointed plug, the shaft of which entered the barrel for a short distance. This pipe was driven vertically into the ground about 6 feet away from the tank wall. When it had descended to nearly its full length, a second piece of pipe was screwed on, driven down as before, and then

connected with a third, fourth, &c., length till the whole reached a depth of 48 feet. Lengths of 1-inch pipe screwed together were next passed down the larger pipe till they rested on the shoulder of the pointed plug; a smart blow on the top then driving the plug farther downwards, and leaving the mouth of the 2-inch pipe clear. The inner pipes were withdrawn, the outer barrel was connected with the pressure vessel, and as much cement cream was injected as the hole would absorb. The large pipe was then hauled up through a distance of a few feet, and the operation of cement injection was repeated. It was next raised a little farther (a length of barrel being removed from the top when necessary), and the same process was gone through till only one length remained in the ground. Below the depth of 48 feet, the soil was found not to have become porous, nor to require strengthening with cement; but at the worst places, which were met with at depths between 24 and 45 feet under the surface, quantities of cement mortar containing up to 1·5 tons of neat cement were absorbed at one spot. A ring of such holes a few yards apart was made and filled with cement all round the holder tank—21 of them being necessary to encircle it. In consequence of this treatment, the tank remained perfectly tight for eight years, when the factory to which it belonged was thrown out of action.

REGULATION OF AIR-GAS APPARATUS ABROAD.

It is interesting to notice that the authorities on the Continent are becoming aware of the desirability of exercising strict control over the design, erection, and manipulation of plants for the preparation of air gas, whether the plants are used by private consumers or are intended for public gas supplies.

A code of eleven clauses was issued in the St. Gallen Canton of Switzerland about the middle of 1904, while on Jan. 15 last the Minister of the Interior of the Grand Duchy of Hesse published a similar code extending to twenty clauses. The two sets of regulations run on almost parallel lines; and, allowing for the difference in physical and chemical properties exhibited by light petroleum spirit and calcium carbide, the codes are very similar to the new general German code issued by the Bundesrath last October to govern acetylene installations.

Omitting all reference to the more obvious rules, the Hessian code stipulates for compulsory notification not later than the time when the apparatus is brought into use, or seriously altered from its original design. The apparatus must be erected in special apartments not under rooms occupied by human beings, and separated from such rooms, from barns, and from stables, by either a fire-proof wall, or a distance of 15 feet. The plant houses must have fire-proof floors, and doors opening outwards into the open air; they must be protected from frost, and be warmed only by steam or hot water. If artificial lighting is employed, the light must be placed outside, and shine through a window that does not open. The window should be in a wall where there is no door. If the light is air gas, some other independent source of light must be kept in readiness, in case of a failure of the first. Any motor used to maintain the air current in the plant must be placed in a separate room, with a fire-proof wall between it and the carburettor; and the driving-belt must run in a closed conduit fixed soundly in the brickwork. [The Swiss code only insists on a separate room for the motor when the plant supplies twenty lights or more.] The spirit must be pumped or blown from the closed iron store tanks into the carburettor—the use of a funnel for filling purposes being prohibited. The store tanks must be in a separate fire-proof room. [Hence the apparatus house must apparently have at least three distinct apartments without internal communication.] The plant house must have ventilators top and bottom; several openings being provided close to the floor with a total area of at least 62 square inches. These openings must be protected outside with iron grids; and precautions must be taken that no vapour escaping through them can accumulate dangerously or enter drains and sewers. The gas-pipes must be tight at an effective pressure of 0·1 atmosphere, and must be sufficiently protected from frost and cold.

The rules do not apply to the use of air gas for educational or experimental purposes, nor cover portable spirit blow-pipes.

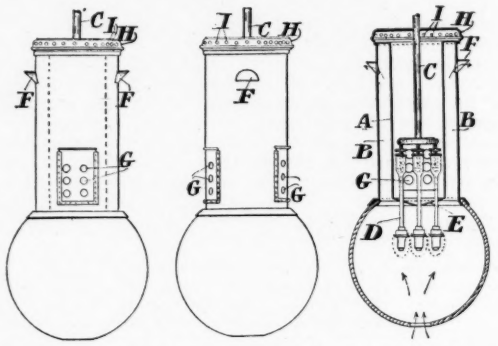
Mr. Charles Greenwood, a Director of the Harrogate Gas Company, whose death was noticed recently in the "JOURNAL," left estate of the gross value of £138,807.

Ramie for Gas-Mantles.—At the Society of Arts last Wednesday, Mrs. Ernest Hart read a paper, on "Ramie and its Possibilities," in the course of which she referred to the use of this material for making gas-mantles. She pointed out that what was required was an absorbent netting which would take in the mineral salts and be afterwards burnt away; leaving the least amount of a perfectly white ash behind. Egyptian cotton had been used for this purpose; but mantle manufacturers found in a webbing made of ramie yarns a material which suited their requirements exactly. This discovery had, she said, led to a great development of the existing ramie-spinning mills of Germany and France, and to the perfecting of their processes and machinery.

REGISTER OF PATENTS.

Inverted Gas-Lamps.—Reiss, C., of Berlin. No. 4987; March 9, 1905. Date claimed under International Convention, April 7, 1904.

This invention relates more especially to inverted lamps in which the mixing-tubes are surrounded by a receptacle open at the upper end. In former arrangements, these receptacles were used with the object of keeping away the burnt gases from the mixing-tubes and effecting a circulation of air downwardly from above. The main feature of the present arrangement consists in the fact that the receptacle reaches above the mixing-tubes and is provided at its lower end with air-inlet openings, so that an air-current permanently passes from below through the interior of the receptacle, thereby cooling the mixing-tubes and preventing too strong a heating of the latter—fresh air being permanently drawn into the interior of the receptacle and then flows upwards.

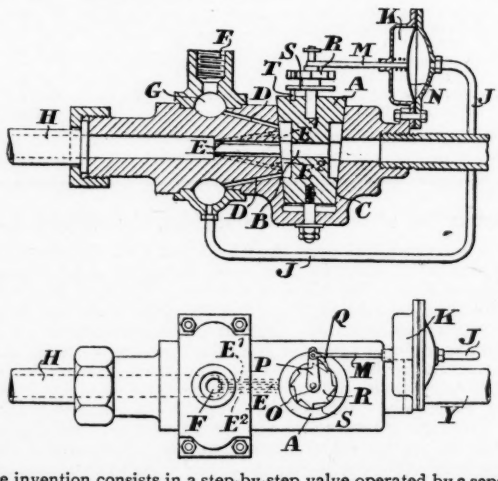


A is a receptacle, open at the top, surrounding the mixing-tubes of the burners D, which latter lead air-tight through the bottom. B are passages for the exit gases; C is the gas-conduit for feeding the burners; and F are exit openings arranged in the upper part of the passages B. G are openings arranged in the lower part of A through which the fresh air enters. The upper end of A is closed by a cover H provided with openings I, through which the air leaves.

The operation is as follows: The fresh air enters the openings G and feeds the mixing-tubes of the burners D; whereas the remaining air is heated in A and leaves through the openings I, thereby permanently sucking in a sufficient quantity of air and cooling the mixing-tubes and the gas-conduit C. The gases of combustion enter from the surrounding globe and leave the exit passages B through the openings F.

Controlling Gas and Air Distribution Systems.—Scott-Snell, C., and the Air Light Company, Limited, of Victoria Street, S.W. No. 5462; March 15, 1905.

This invention relates to the controlling and distribution of gas and air for incandescent lighting; and concerning it, the patentees remark: In gas and air supply circuits, it is generally desired to use the lamps sometimes for ordinary lighting, sometimes for intensified lighting, and again at other times the main burner is required to be extinguished. Further, two different pressures are sometimes used on the same circuit; and in some cases the lamps on one pressure are required to be controlled from the generating station without affecting the lamps on the other pressure. The objects of the invention are to provide means whereby the gas and air supply to a set of lamps may be regulated from a station so as to give ordinary lighting, intensified lighting, or to shut off the supply of gas altogether as desired. A further object is to render such means operative on one of the parts of a two-pressure circuit without affecting the other.

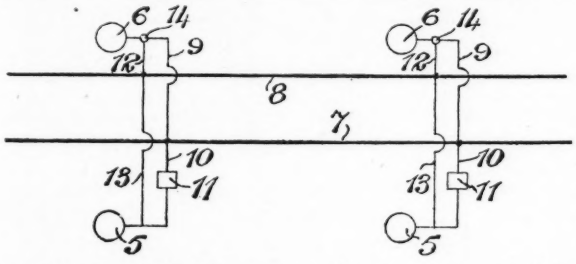


The invention consists in a step-by-step valve operated by a separate air supply and adapted to supply lamps with (1) gas for ordinary lighting, (2) gas and air for intensified lighting, or (3) to cut off the supply altogether as desired; the valve being operated by a diaphragm, which is raised or lowered by temporary variations of the pressure in

the separate air-supply circuit. It further consists in a multiple pressure distribution system, one part of which is adapted to be controlled by a step-by-step valve as described, while the other part remains unaffected.

The taper cock A is provided with a through passage B. It works in a seat C, to which there lead air-ducts D and gas-ducts E, E^1, E^2. Compressed air enters from the pipe F into an annular groove G, and the air-ducts meet the cock seat in points a little distant from the gas-ducts. Gas is supplied through a pipe H. A pipe J leads from the annular space G to a diaphragm chamber K; while a rod M connects the diaphragm N to a ratchet-and-pawl mechanism, consisting of a crank P loosely mounted on a spindle O, stepped in a recess in the cock. The crank carries a pawl Q, which engages a ratchet wheel R fixed to the spindle O and having eight teeth. Carried by the spindle so as to rotate with it, there is a disc S having a pin T, which projects into a recess in the cock. In this way, the rotation of the ratchet wheel is transmitted to the cock barrel. The central passage B connects diametrically opposite recesses in the form of a St. Andrews cross. The operation of this device is as follows: The air supply circuit is made to control the operation of the cock. Thus assume that the cock is in the position shown—that is to say, both gas and air are being supplied to the lamps which are then working under the "intensified" system. Now assume that it is not required to use intensified lighting—in other words, it is desired to shut off the air supply. The pressure in the air-mains with which the pipe F communicates is reduced, thus causing the diaphragm N to collapse, whereby the pawl Q turns the ratchet wheel R and cock barrel through one eight of the revolution. By this means the vertical recess in it is carried out of register with the air-ducts D, and the supplementary gas-supply ducts E^1 and E^2 are also cut off. The lamps will now be working with ordinary low-pressure gas. For the purpose of turning the lights out altogether, the air pressure is again reduced, and the cock barrel again turned through one-eighth of a revolution, when the supply of gas is completely shut off and likewise the air.

The apparatus may be readily used in a circuit working at two different pressures—say, a high and a low. A diagram of such a circuit is given; the numerals 5 being used to denote the low-pressure lamps, while 6 denotes high-pressure lamps. Assume that the lamps 6 are street lights while 5 are shop front lights, and that it is desired to effect the lighting and extinguishing of the street lights automatically. The air-mains 7 and gas-mains 8 are led along (preferably underground) in parallel lines, and branch pipes 9 lead from the air-mains to the high-pressure lamps, while branches 10, provided with reducing valves



11, supply air at reduced pressure to the shop front lamps. Gas is led from the mains 8 to the high-pressure lamps through branches 12 and to the low-pressure lamps through branches 13. A cock 14 of the type described above is provided near the high-pressure gas-lamps 6. With this arrangement the diaphragm N of the gas-lighting device is arranged to operate the pawl when the pressure in the air-mains is reduced to that, or nearly to that, at which the low-pressure lamps 5 work, and thereby the automatic control of the street-lamps does not cause any fluctuation in the shop front lights.

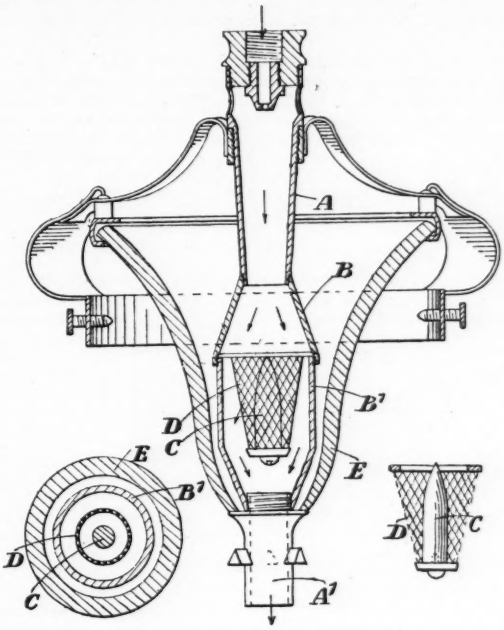
Inverted Incandescence Gas-Burners.—New Inverted Incandescent Gas-Lamp Company, Limited, and Bridger, J., of Farringdon Avenue, E.C. No. 6133; March 23, 1905.

The object of this invention is said to be "to provide a burner in which an intimate or perfect mixture of the air and gas shall be ensured, which shall be noiseless when in use, and in which liability of the flame to light back is obviated, so rendering the burner efficient and safe at all times, while greatly enhancing its lighting and illuminating properties." [In connection with this patent, see No. 24,815, p. 118.]

The burner comprises (in combination) a detachable mixing-chamber, made in two parts, and interposed in the length of the bunsen tube, or at the end of it; a "foraminous" or reticulated detachable cage or basket suspended in the chamber; a deflecting cone arranged apex upward in the cage or basket; and an external porcelain (or metal) cone or deflector surrounding the mixing-chamber and a portion of the bunsen tube. These devices are so disposed relatively to each other that the air and gas initially mixed in the bunsen tube shall, on entering the mixing-chamber, be deflected outwardly by the cone and then pass through the cage or basket, so that they become split up into numerous fine jets or streams, which then combine, and pass from the mixing-chamber to the burner-tube or nozzle, "in an intimately mixed condition, suitable for proper combustion;" the mixing-chamber being, at the same time, protected from hot products of combustion by the external cone or deflector.

The bunsen tube is divided (as shown) into two portions, the upper of which (provided as usual with air-holes and a nipple or injector A) conducts the initially mixed air and gas to the mixing-chamber B, B^1, to the upper part of which it is secured. The lower portion A^1 (the burner-tube) is, in similar manner, secured at its upper end to the lower part of the mixing-chamber, and at its lower end carries the mantle (not shown). The internal deflector C is a cone, or conoid (either solid or hollow), and arranged apex upward, within the cage or basket D of wire gauze of suitable mesh. The cage has, at its upper open end, a rim or flange by means of which it is seated upon the upper edge of the part B^1 of the chamber, and when in place is retained firmly in position by an annular shoulder on the upper part B of the mixing-chamber. From this rim or flange, the cage is suspended, and carried within the deflector C, which may be secured to a plate or disc at the bottom of the cage. The deflector extends upwards to a point approximately level with, or just above, the rim or flange of the cage D.

Between the deflector and the sides of the cage or basket D, there is an annular space, and between the cage and the wall of the chamber B, B^1, there is another annular space; the arrangement being such that the imperfectly mixed air and gas, on issuing from the upper portion of the bunsen tube, are deflected by the deflector C, and thus caused to pass through the meshes of the cage D, after which, broken up by their passage through the cage, they flow downwardly, re-unite near the outlet end of the mixing-chamber, and enter the burner-tube A^1 in "an intimately mixed condition, suitable for proper and silent combustion."



E is the external cone or deflector (of porcelain or metal) serving to protect the mixing-chamber from the hot products of combustion, and deflecting the hot air away from the air-inlets. It is arranged to surround the mixing-chamber, together with a portion of the upper part of the bunsen tube; and there is an annular space between these parts to permit circulation of air around the mixing-chamber, for the purpose of more effectively insulating it.

By the arrangement described, it will be seen, the patentees remark, that the combustible mixture of air and gas undergoes two mixings—viz., the initial or preliminary one in the upper part of the bunsen-burner tube, and a further or additional one in the mixing-chamber. Hence the mixture is brought into a thoroughly intimate condition, so as to "render it eminently suitable" for inverted incandescence gas lighting.

Gas-Producers.—Tangyes, Limited, and Robson, J., of Handsworth. No. 8534; April 20, 1905.

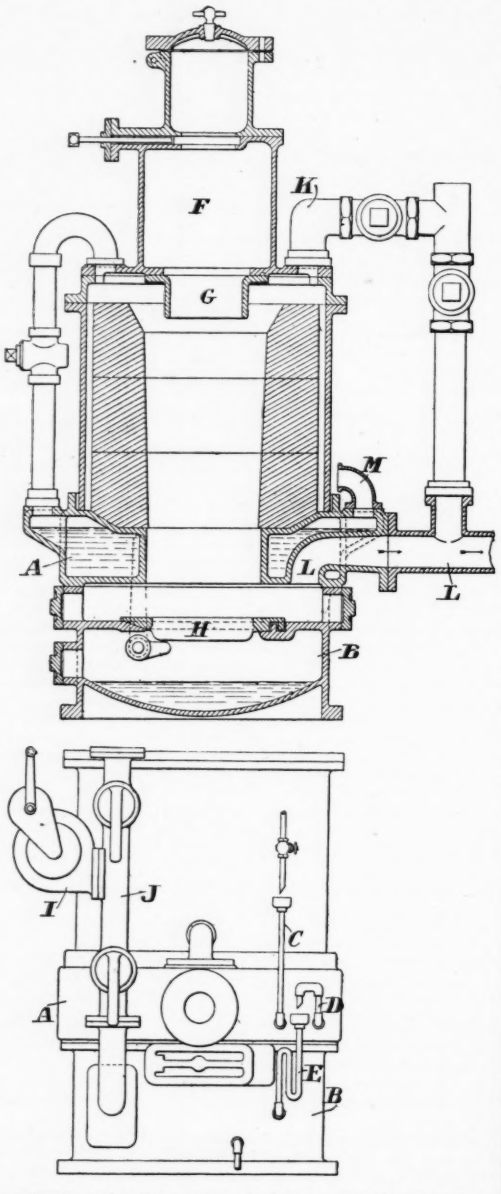
The principal object of this invention is to provide a gas-producer used in connection with gas-engines in which coal containing considerable tarry matter can be used "so that gas practically free from tar is produced, and therefore the deposit of tarry matter on the valves, and consequent clogging of the valves and stoppage of the engine, are prevented." The producers to which this invention relates (the patentees remark) are generally called suction gas-producers, although they may be worked by pressure instead of suction; and these, as hitherto made, have, in cases where the presence of tar in the gas has to be avoided, necessitated the use of fuel containing but little tarry matter—such as anthracite coal.

The combustion-chamber of the producer is preferably cylindrical (see p. 118); and internally lined with fire-brick material throughout the part which contains the fuel under combustion. Beneath the combustion-chamber is an annular chamber A (the "vapour-chamber"), which contains the water to be heated, and through which air is passed to take up vapour of water—the moisture-laden air being conducted from the vapour-chamber into the upper part of the combustion-chamber to pass down through the burning fuel. The combustion-chamber and its refractory lining rest upon the chamber A, which can be supported by a casting containing the fire-grate and ash-box; openings, provided with doors, being made through the casting for giving access to above the grate and to the ash-box B when required. Water is supplied to the vapour-chamber at C, and is maintained at a constant level by the overflow pipe D; and excess of water may be run by the water-seal pipe E into the ash-box to keep it cool. An overflow water-seal pipe at the bottom allows excess water to pass away into a drain.

Above the combustion-chamber is the fuel-inlet chamber F, from the lower part of which depends a tube or curtain G, to a distance into the combustion-chamber which determines the depth of fuel through which the air charged with water-vapour shall pass. Over the fuel-inlet chamber is a fuel-charging hopper, communicating with the fuel-inlet

chamber by an opening controlled by a valve operated from outside the apparatus. The cover of the charging-hopper is provided with a hole and plug, at top, through which a bar can be passed to stir the fuel in the combustion-chamber.

When the producer is to be started, a fire is lighted on the fire-grate and urged by means of a fan I blowing air through the pipe J into the ash-box and up through the fire. The pipe also preferably extends upwards and communicates with the upper part of the combustion-chamber. It is provided with valves above and below the fan; so that the fan can be used either for forcing air down through the fuel or up through it. In starting, the upper valve is closed, while the lower one is open. Fuel is fed to the combustion-chamber until a sufficient depth is obtained; and the blowing of air up through the fuel is continued until the fuel is incandescent for a suitable distance upwards. The waste products of combustion are carried away by a branch pipe K leading into an outlet pipe, which preferably extends downwards and communicates with the outlet pipe L for gas from the producer. Valves are provided in the branch and outlet pipes, so that the latter can be



put in communication with the upper part of the combustion-chamber, or with the gas-outlet below, as required.

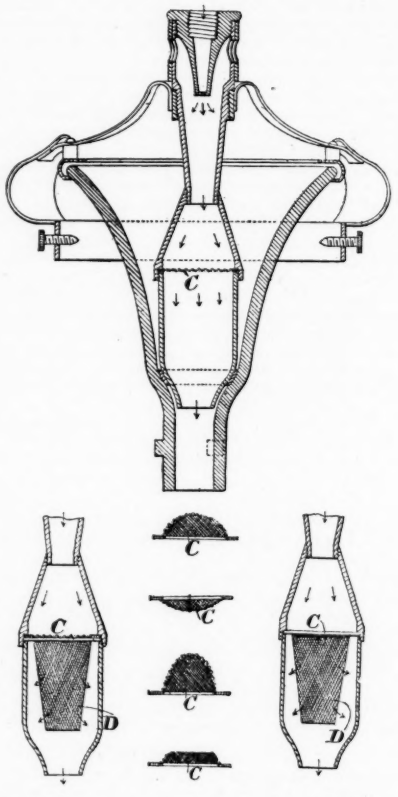
When the fuel is in a sufficiently incandescent condition to receive the air laden with moisture, air is drawn—by the suction stroke of an engine, or forced, by means of a fan, or the like—through the opening M, into the chamber A, and, in its passage, takes up water vapour, which is conveyed to the top of the combustion-chamber, passes down through the incandescent fuel, and is decomposed; the producer gas formed passing out by the outlet L and to (as indicated by the arrow) the cooler and scrubber, or the like.

The incandescent fuel being in contact with the chamber A, heats the water in it sufficiently to produce steam, to be taken up by the air, and as the moistened air passes downwards, while the green fuel is admitted at the top and is incandescent below, the tar in the fuel will be slowly distilled as the fuel becomes gradually heated in its passage downwards. This distilled tar, in passing downwards through the incandescent portion of the fuel, will be decomposed and converted into fixed gas before leaving the producer. The escaping gas will also part with some of its heat to the vapour-chamber.

Inverted Incandescence Gas-Burners.—New Inverted Incandescent Gas-Lamp Company, Limited, and Bridger, J., of Farringdon Avenue, E.C. No. 24,815; Nov. 30, 1905.

In patent No. 6133—see p. 117—there is described an inverted incandescence gas-burner provided with a mixing-chamber interposed in the length of the bunsen tube, or fitted to the end of it, and containing a foraminous or reticulated detachable cage or basket furnished with an internal deflecting cone arranged apex upwards, together with a porcelain (or metal) external cone or deflector arranged to surround the mixing-chamber and a portion of the bunsen tube. The patentees have, however, since discovered, from experiment, that although the internal deflecting cone "is eminently satisfactory for the purposes for which it is intended, it may, nevertheless, under certain conditions of gas supply—such, for instance, as abnormally low pressure and quality—be conveniently omitted, and this without impairing the efficiency of the burner." They have also further ascertained that, in some cases, even the "foraminous or reticulated cage or basket" may be dispensed with. But as the mixture of air and gas must not pass from the bunsen tube direct to the flame-nozzle without undergoing some additional mixing, for the internal cone, or for the cone and the cage or basket, means hereafter described are substituted, which will operate to produce the mixing "by breaking or splitting up the incoming mixture into numerous jets or streams prior to its passing into the flame-nozzle."

The illustration shows a vertical section of the burner provided with one form of the improved means for bringing about the additional mixing of the air and gas—the usual mantle and its support being omitted; and there are also several modified forms.



The internal deflecting cone and the cage or basket referred to in the earlier patent are absent; and in their stead the mixing-chamber is provided with a horizontal disc or diaphragm C, of wire gauze (15 to 25 meshes to the inch), or a finely perforated plate, through which the mixture of air and gas, after leaving the bunsen tube, is forced to pass. The mixing-chamber is advantageously formed in two parts, as in the earlier mentioned specification; and in the present arrangement it is shown as fitted to the lower end of the bunsen tube, although, if desirable, it may be interposed at any suitable point in the length of the tube.

The wire gauze disc or diaphragm C, which is similar to those used in certain inverted burners, is here shown flat, and provided with a rim or flange. It may be detachable, or be a fixture within either the upper or lower portion of the mixing-chamber. It is, however, advantageously retained in place by means of an annular shoulder in the upper portion, when this latter is screwed over the lower part.

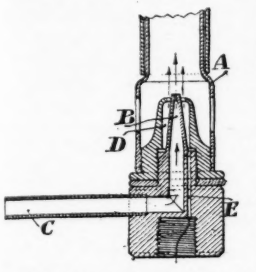
Instead of the disc being flat, it may be convex, or concave, or conoidal, or corrugated, fluted, or wavy, as shown in the details; or it may be otherwise suitably shaped, "in order that it shall present a larger or more extended area or surface to the incoming mixture than would a flat disc, and so cause the mixture to be still further split up into numerous fine jets or streams. In all the four modified forms referred to, it is also advantageous to provide a rim or flange to secure the diaphragm firmly in position between the upper and the lower portions of the mixing-chamber, as already explained.

In the other two arrangements, any of the wire-gauze discs are used in conjunction with the foraminous cage or basket D (which may have a solid bottom if necessary). Both these devices may be of wire gauze of the same mesh; or the diaphragm may be of one mesh, and the cage

or basket of another mesh—this latter construction helping the better to split up the incoming mixture prior to its passing into the flame-nozzle.

Incandescent Burner.—Murinick, A., of St. Petersburg. No. 26,882; Dec. 23, 1905.

This invention relates to an incandescent gas-burner in which compressed air is injected into the mixing-tube through a pipe passing through the gas-nipple, so that the gas issuing from the nipple flows between the stream of compressed air and air drawn in through the openings in the bunsen tube. The burner for the compressed air supply has a regulating device for the gas supply, in which a number of orifices for the gas, arranged in the nipple-cap, are variable in their sectional area by a passage controlled by a central conical valve.



The nipple consists of two portions—the lower provided on top with a concentric cylindrical extension for screwing thereon the upper portion of the nipple, on which upper portion the mixing-chamber A, provided with slits in its lower end, is secured by a screw thread or a bayonet joint, so that both parts are adjustable longitudinally. The hollow cone B, in the middle of the extension, is provided with a very small exit orifice, through which the compressed air, supplied by the pipe C through passages arranged at right angles to each other in the lower portion, is sprayed with considerable axial velocity into the mixing-chamber. When the cap of the nipple is screwed tightly down to the lower portion, the hollow cone B projects outwards slightly beyond the cap, and completely closes the central orifice of the latter; so that the combustible gas, which enters the annular space D through the channels E, can enter the mixing-chamber only through a number of orifices provided in the cap around the hollow cone. By means of this arrangement of orifices, the issuing gas will surround the jet of compressed air in the form of a hollow cylindrical stream, and "an intimate mixture of these two will thus be effected." When the cap is slightly unscrewed, an annular exit opening for the gas will be formed around the hollow cone B, which can be adjusted in accordance with the demand for gas.

Time Mechanism for Controlling the Supply of Gas.—Horstmann, A., S. A., G. O. H., & E. H., and Edgar, W. T., of Bath. No. 27,290; Dec. 30, 1905.

This invention relates to mechanism used in street illumination in which clockwork is employed to switch on or off the gas at a predetermined hour.

The object of the invention is to provide means whereby the tap or switch may be operated by hand independently of the clockwork or other automatic mechanism, so that the switch may be turned on when a fog occurs during the daytime, and off again when the atmosphere has cleared.

Full particulars of the arrangement referred to were given in the "JOURNAL" so recently as Feb. 27, pp. 565-6.

APPLICATIONS FOR LETTERS PATENT.

7219.—SCHMITZ, W., "Mantle holder." March 26.
7276.—WERWATH, E. H. O., "Incandescent burners." March 26.
7338.—LEA, J. W., and PERRINS, J. H., "Gas-pendants." March 27.
7358.—PALMER, F., "Suction gas-producers." March 27.
7421.—MAZZA, E., "Separating the constituent elements of gaseous mixtures." March 27.
7450.—KING, J., JUN., and BURNETT, J. R., "Gas-furnaces." March 28.
7479.—CLOUDSLEY, J. L., JUN., "Apparatus for use in gas manufacture." March 28.
7496.—FLEISCHHAMMER, F. O., "Gas-burners." March 28.
7499.—BORMANN, J. G. L., "Suction gas-generators." March 28.
7538.—MARSHALL, F. D., and HERSEY, S., "Filters." March 28.
7543.—WILD, L. W., "Photometrical apparatus." March 29.
7561.—BENTLEY. G. H., "Removing tar and similar impurities from producer and like gas." March 29.
7580.—THORN, A. W., "Acetylene apparatus." March 29.
7581.—THORPE, C. P. E., and DOUGAN, O. W., "Toughening mantles." March 29.
7601.—GRAHAM, M., "Hot-coke conveyors." March 29.
7603.—ROLLIN, C., "Gas-turbines." March 29.
7608.—PRICE, J., and REEVES, T. J., "Pressure-recording apparatus." March 21.
7690.—EVENO, A. A., "Gas maker for heavy oils." March 30.
7758.—DUFF, J. R., "Igniting and extinguishing gas." March 31.
7760.—CROSSLEY, J., "Supporting mantles." March 31.
7799.—LAKE, H. W., "Liquid meters." A communication from J. A. & E. S. Cole. March 31.
7814.—WOUWERMANS, P. VON, and LOEWENSTEIN, L., "Gas-mixing apparatus." March 31.

The Coventry Town Council have agreed to a recommendation of the Gas Committee that a certain house situated on Foleshill Road, close to the entrance of the new gas-works, be taken on lease for seven years, at a rent of £45 per annum, and be used as a residence for the Works Manager of the new works when appointed; the lease to contain an option of purchase by the Corporation at any time during the term, at a price not exceeding £1200. The house was built for the former Clerk of the new gas-works by his father; and as he has now received another situation, the owner desires to dispose of it, and so has offered it on lease or for sale at cost price.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

Penalty or Liquidated Damages.

SIR,—The important difference as to whether a sum of money to be paid upon breach of any contract is to be regarded as a "penalty" or as "liquidated damages," has quite recently once again come before the Courts; and I thought that perhaps it might be of some interest to mention the matter in your columns.

The case is that of *Pye v. British Automobile Commercial Syndicate, Limited;* and it is reported in the "Law Reports" (which were published on the 2nd of this month), 1 K.B., p. 425. The particular facts of the case need not concern us; but Mr. Justice Bigham's judgment is a lucid and important one, and contains two passages that I should like to quote.

On p. 429, he says: "I think the only rule which applies to all cases is that the Judge must look to all the circumstances of each particular contract—to what the parties did, as well as to the language used; and must say from them what the intention of the parties was"—that is, as to whether the sum agreed upon to be paid was intended to be a penalty or liquidated damages.

Again, on p. 430, there begins this sentence: "As to the exact words used in agreements, as to the sum being regarded as liquidated damages, and not as a penalty, it has been laid down that Judges ought to disregard the expression 'liquidated damages,' although it has been knowingly used by the parties."

His Lordship, in 1906, thus follows and confirms the judicial authority of Lord Chief Justice Wilde, in 1849, in *Sainter v. Ferguson* (7 C.B., 727), upon which I relied for the statement in my paper* on "Legal Notes on Contracts," that: "The specification may call the sum anything it likes—penalty or liquidated damages; but what it actually is 'is a question of law to be decided by the Judge on a consideration of the whole instrument.'"

4, *Elm Court, Temple, E.C., April* 7, 1906. C. E. BRACKENBURY.

Criticism of the Mid-Oxfordshire Gas Company's Prospectus.

SIR,—In the issue of the "JOURNAL" for April 3, I observe a condensed prospectus of the Mid-Oxfordshire Gaslight and Coke Company, Limited. I have since obtained, in the proper quarter, a copy of the complete prospectus.

As one largely interested in the gas industry as a whole, I beg the opportunity, through your columns, of protesting in the strongest possible manner against the prospectus issued by the promoters of this undertaking.

I observe that there is offered for subscription: £15,000 of 5 per cent. debenture stock; £20,000 of 5½ per cent. preference shares; and £20,000 in ordinary shares.

From the condensed prospectus as published in the "JOURNAL" and also in the Daily Press, there is nothing that would reveal to the intending investor that the debenture stock now offered is not a first charge on the undertaking, but is "subject, nevertheless, to certain debentures called 'special debentures,' and to an amount of special debenture stock, which has already been issued or agreed to be issued—such special debentures or special debenture stock representing an amount equal to two-thirds of the purchase price of various gas undertakings and works acquired by the Company, each of which series or issues of special debentures or special debenture stock constitutes a first charge upon the property so acquired, and are also subject to any further special debentures or special debenture stock, not exceeding the proportion aforesaid, which may be issued on the acquisition of any further gas undertakings or works."

The words quoted above appear in small print at the foot of page 3 of the full prospectus; but I do suggest that, stated in the place and in the manner indicated, they are not sufficiently obvious for the ordinary investor who is not versed in technical details.

On the same grounds, I protest against the statement at the head of the prospectus showing that five of the Companies have paid, over long periods of years, dividends as follows:—

Bicester Gas, Coke, and Coal Company, Limited	420½	per cent.	since	1849
Chipping Norton Gas and Coke Company, Ltd. .	100	,,	,,	1887
Charlbury Gas Company, Limited	101½	,,	,,	1872
Witney Gas and Coke Company, Limited. . .	27	,,	,,	1900
Woodstock Gaslight, Coke, and Coal Co., Ltd. .	245	,,	,,	1859

When the above statement is analyzed, it is seen that the following average dividends have been declared:—

Bicester Gas, Coke, and Coal Company, Ltd.	over 56	years	7½	per cent.
Chipping Norton Gas and Coke Company, Ltd.	,, 18	,,	5½	,, ,,
Charlbury Gas Company, Limited	,, 33	,,	3 1/16	,, ,,
Witney Gas and Coke Company, Limited . .	,, 5	,,	5⅝	,, ,,
Woodstock Gaslight, Coke, and Coal Co., Ltd.	,, 46	,,	5⅛	,, ,,

But as no disclosure is made as to the capital on which these distributions have been made, or its relation to the present purchase-money to be paid for the undertakings, the statement is of no value, except so far as it may serve to dazzle the unwary investor.

Nowhere does the prospectus disclose what have been the profits in money earned by the various undertakings now acquired. Needless to say, no figures are given anywhere as to the quantity of gas made or sold, except that at Witney there is a new gasholder with the notable capacity of 58,000 cubic feet, recently erected; that the Bampton works are capable of the remarkable output of 4 million cubic feet of gas per annum, and that a sale of gas equivalent to a minimum consumption of 6 million cubic feet per annum is guaranteed for four years; and

* See "JOURNAL," Vol. XCIII., p. 647.

that at Shipton a minimum consumption of 2 millions per annum is guaranteed for four years!

The Company starts unhampered with any engineering advice; nor can I see that any Auditors have been appointed.

The prospectus discloses the interesting fact that, under an agreement dated the 23rd of March, 1906, made between the Company and the Finance and Construction Company, Limited, the latter Company "agree to construct works at Chipping Norton, and lay the mains for their improvement and enlargement, as specified in the said agreement; also to guarantee a reduction of the present leakage of gas in the mains of the various gas undertakings, and to pay and discharge all legal and other costs, charges, and expenses in connection with the application by this Company for parliamentary powers, and should for any reason such application not be granted in the present session of Parliament, to make application at the request of this Company at the next session, and pay all costs, charges, and expenses in connection therewith; and also to pay and discharge all costs and expenses for printing, advertising, and issuing the prospectus, and all legal and other costs in connection with the carrying out of the purchase of the undertakings purchased or agreed to be purchased by this Company (except stamp duties), formation expenses, and other matters. The consideration-money payable under the agreement has been fixed at the sum of £17,500." No disclosure is made in the prospectus as to the size of the works at Chipping Norton, or as to the amount of the reduction of the leakage to be effected; but we are told that the preliminary expenses included in the £17,500 above mentioned are estimated at £5000, or (say) 10 per cent. on the present proposed issue!

The catchpenny device of publishing illustrations of gas lighting in Ceylon, at the Mansion House, and in West Bromwich, is too ludicrous for comment. Some "JOURNAL" readers are no doubt aware of the want of success attending various other gas undertakings whose prospectuses bear a strong family likeness to this one.

Many people in the gas world have been inundated with this prospectus, accompanied by a series of photographs, which apparently prove nothing more than the fact that there are market-places in certain of the towns, or that at Witney there actually is a gasholder.

I am pleased to notice, from "The Times" of yesterday, that the Committee of the House of Commons on Unopposed Bills have taken a strong line with regard to the Bill promoted by the Company; and, judging from the report, there appears to be a strong probability that at least the undertaking will not have any parliamentary powers to dangle before the eyes of unsophisticated investors as a further inducement to part with their money.

I happen to be aware of several instances where the Company—although their paid-up capital prior to the issue of this prospectus amounted to £20 allotted and £4 paid—have been formulating proposals to manufacturers and others, under which the manufacturers would be granted the exclusive right to supply their particular commodities to the Company on terms which included part-payment in debentures or debenture stock.

I can only hope that the above remarks, coupled with the action of the Parliamentary Committee, the report of which will no doubt appear in the "JOURNAL,"* will be sufficient to warn other suppliers from being led into making contracts with this concern, and further that, through the medium of the "JOURNAL," the Secretaries of Gas Companies and others may be able to warn investors against subscribing for the capital now offered.

I enclose my card and remain,

April 7, 1906. SUBSCRIBER.

Purification Results.

SIR,—"An Old Foreman" is indeed getting excellent results. If he would kindly inform his less fortunate brethren how he obtains them, we will not say that he is "blowing his own trumpet," or that he is anxious to change his situation, but will give "honour to whom honour is due." There is still one thing short in the data that "An Old Foreman" has given us. Will he kindly say what coal and cannel he uses, the percentage of the latter, and the illuminating power of his gas.

I regret that I cannot claim to run my purifiers during December without a change; and I shall be glad to learn the secret of how to do it. Still, there is a greater discrepancy between "An Old Foreman's" make and ours than he gives us credit for. Our maximum make exceeds 1,300,000 cubic feet per day, and the average over the heaviest month was 1,224,400 cubic feet—a sufficient difference to render all comparisons between us untrustworthy.

I think that Messrs. Cutler and Sons have made another mistake in their anxiety to agree with me, and once more make capital at my expense; for not only does "the efficiency of a purifier depend on the velocity of the gas passing through it," but also on "the length of time the gas is in contact with the oxide." In my opinion, this is the weak spot of the Jäger system—as was recognized at the Manchester meeting, when Mr. Duxbury suggested that the probable direction of purifier development in the future would be to build them vertically instead of horizontally. Time contact is everything; and, as Mr. Shadbolt has pointed out, the Jäger system, while actually reducing the speed of the gas though the material, reduced the period of contact as well. It appears that Messrs. Cutler and Sons have themselves recognized this when they patented a variation of the original arrangement of Jäger grids.

It would be interesting to many of us if some engineer having the Jäger grids in use would give us, for comparison, the cost of emptying and refilling the purifiers under the new and old systems. I cannot find that this has been done by anyone yet.

In conclusion, I am sorry that Messrs. Cutler and Sons will continue to make comparisons between two works working under very different conditions. I regret, too, "An Old Foreman's" closing paragraph, as I am comfortable in my present berth, and am not seeking another.

Stretford, April 4, 1906. H. KENDRICK.

* The report of the proceedings referred to will be found in our "Parliamentary Intelligence."—ED. J.G.L.

Mr. Leslie Wilson's Paper on Retort-House Governors.

SIR,—In the course of the discussion of Mr. Wilson's paper on "Retort-House Governors," read before the Midland Junior Association, and reported in the "JOURNAL" for the 3rd inst., I gave some figures with regard to sperm value, deduced from Mr. Wilson's particulars; but I find now, on reading the paper, that these figures are incorrect, owing to my having understood Mr. Wilson to say 16·5 candles, instead of 15·6, for the illuminating power of the gas made before using the governors. The correct figures should be 616 lbs. of sperm per ton before, against 662 lbs. per ton after using the governors—being a gain of 7 per cent., instead of 2 per cent., which the above mistake led me to believe.

In view of Mr. Bywater's remarks, and in justice to Mr. Wilson, I shall be glad if you will allow me space to make this correction.

West Bromwich Gas-Works, April 4, 1906. A. O. JONES, Assistant Engineer.

Water Question at Devonport.

SIR,—With reference to the article published in the "JOURNAL" of the 13th ult., I desire to call your attention to the following statements, which are inaccurate and misleading.

The statement that "the Corporation seem to have rather unnecessarily shut themselves off from the prospect of an increasing revenue," is not correct. The facts are that when both the Devonport Water Company's Bill and the Purchase Bill of the Corporation were before Parliament, the Admiralty insisted on the insertion of a clause in whichever Bill passed, making clear the limits within which the Admiralty were entitled to the supply of water under the Water Act of 1793—the alternative being that the veto of the Crown would be enforced and the Bill lost. When the Corporation's Bill passed, this provision was inserted in section 9 of the Act, which provides "that the Company's Acts shall, as from the transfer, be repealed except . . . the sections of those Acts so far as set forth in the schedule; and those sections . . . shall apply and have effect as if the Admiralty dockyards and establishments within the borough had been referred to in the section 20 of the Act 33 Geo. III. c. 85 (1793), instead of His Majesty's dockyard and departments at the town of Plymouth Dock."

By this it will be seen that the Corporation had no option in the matter, so cannot be said to have "unnecessarily shut themselves off from the prospect of increasing revenue."

The next statement in the article, that "if they—*i.e.*, the Corporation—are to act upon their contention in the arbitration, they will surrender to the Admiralty the right to an unrestricted use of their water upon nominal terms which the Government of the day had inserted in the Company's Act of 1793," is also incorrect. The Corporation's contention in the arbitration was between themselves and the Company, and could not affect in any way the position of the Admiralty, which had been clearly defined by the Act of 1902, as previously stated. The question between the Company and the Corporation was whether certain supplies to Admiralty establishments could properly be considered as maintainable income for which the Company were to be compensated. It is, therefore, evident there could be no "surrender to the Admiralty," as suggested by the paragraph in question.

The further statement that, "in the Corporation's own interest, it might have been worth their while to have had this point decided against them; for it seems tolerably certain that the Admiralty's requirements will increase rather than diminish, and the large amount they would pay for water, if charged upon the same rate as other consumers, would have reimbursed the Corporation for the immediate outlay and left a margin of profit," is again incorrect. From what has already been said, it is obvious that, whatever the ultimate issue between the Company and the Corporation might have been, the position of the Admiralty could not possibly have been in any way affected.

The tenor of these statements is such as to lead your readers to conclusions not justified by the facts; and in fairness to the Devonport Corporation they should not be allowed to pass without correction.

Devonport, April 5, 1906. R. J. FITTALL, Town Clerk.

Abatement of Income-Tax in Respect of Depreciation of Plant.

A correspondent writes: With reference to the paragraph on the subject of an abatement of 3 per cent. in respect of depreciation of plant, machinery, &c., which appeared in the "JOURNAL" for the 27th ult. (p. 848), the decision of the Income-Tax Commissioners in the Ascot case is, as you say, of the utmost value to the gas industry; and I am desirous of securing for my Company, if possible, a similar abatement. The *modus operandi*, however, is not clear to me, nor do I think it will be to many more managers and secretaries. In the first place, I take it that the abatement is solely restricted to plant and machinery; and I should like to know exactly what is included under this head. Also, how the value is arrived at; because, in my case, I cannot put my hands on the contracts for a good deal of the plant, and the capital value of the works as set out in the books now available is not subdivided in such a way as would enable me to give or show details of plant and machinery. There are other points which are not clear to me in connection with the method of claiming this abatement; but perhaps I have said sufficient to illustrate the difficulties.

Power Gas for the Potting Trade.—Some time ago, a factory was taken in Hanley for the purpose of carrying out experiments with regard to the application of power gas to the potting trade; and the plant is now almost completed. A considerable amount of interest is being taken in the tests; and if the claims made on behalf of power gas are realized, it is anticipated that the effect on the potting industry will be of a far-reaching character.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Dowlais Gas Bill, Epsom and Ewell Gas Bill, Huddersfield Corporation Bill, Merthyr Tydfil Gas Bill, Watford Gas Bill.

Bills read the third time and passed: Accrington and District Gas and Water Board Bill, Holyhead Water Bill, Mirfield Gas Bill, North Sussex Gas and Water Bill, Wolstanton United Urban District Council Gas Bill.

Bill withdrawn: Llandrindod Wells Gas Bill.

The Glamorgan and South Wales Water Bill and the Truro Gas Bill have been referred to a Select Committee, consisting of Lord Newton (Chairman), the Earl of Westmoreland, the Earl of Wicklow, Viscount Hutchinson, and Lord Teynham; to meet on Tuesday, May 1.

The Bury Corporation Bill, the Cumberland Electricity and Power Gas Bill, and the Newport Corporation Bill have been referred to a Select Committee, consisting of the Earl of Lauderdale (Chairman), Earl Cathcart, Viscount Ridley, Lord Estcourt, and Lord Rossmore; to meet on Tuesday, May 1.

The Crediton Lighting and Power Bill and the Portsmouth Water Bill have been referred to a Select Committee, consisting of Lord Ludlow (Chairman), the Duke of Newcastle, the Earl of Devon, the Earl of Lathom, and Lord Leigh; to meet on Tuesday, May 1.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Accrington District Gas and Water Board Bill, Holyhead Water Bill, Mirfield Gas Bill, North Sussex Gas and Water Bill, Wolstanton United Urban District Council Gas Bill.

Bill read the first time and ordered for second reading: Shrewsbury Corporation Water Bill.

Bill read a second time and committed: Kidderminster Gas Bill.

Bills reported, with amendments: London County Council (General Powers) Bill, New Mills Urban District Council Bill, Uxbridge Gas Bill.

Bills read the third time and passed: Dowlais Gas Bill, Epsom and Ewell Gas Bill, Huddersfield Corporation Bill, Merthyr Tydfil Gas Bill, Watford Gas Bill.

Last Thursday, Mr. Jeremiah MacVeagh, the Member for South Down, asked the Chief Secretary to the Lord Lieutenant of Ireland whether he was aware that four of the nine members of the Urban District Council of Dromore are shareholders in the Dromore Gas Company, who are Contractors to the Council; and, if so, what action the Local Government Board proposed to take in the matter. Mr. Bryce replied that the Local Government Board understood that the facts were as stated by the hon. member. He reminded him that article 12 (5) (*c*) of the schedule to the Local Government (Application of Enactments) Order, 1898, provided that a person should not be disqualified for being a member of a council by reason of being, by himself or his partner, interested in any contract with that body as a shareholder in any joint-stock company.

The London County Council and the Wandsworth Corporation have withdrawn their petitions against the Gas Companies (Removal of Sulphur Restrictions) Bill and the Wandsworth and Putney Gas (Removal of Sulphur Restrictions) Bill. These Bills have therefore been referred to the Committee on Unopposed Bills.

The Standing Orders Committee had under consideration on Tuesday, the Sutton, Southcoates, and Drypool Gas Bill, the promoters of which petitioned for the change of the name of the Company to the East Hull Gas Company; and the alteration was sanctioned. A petition presented by the Shrewsbury Corporation for leave to introduce a Bill to authorize them to construct additional water-works, and for other purposes, was allowed; and, as recorded above, the Bill was duly presented. The Sutton District Water Company have applied for leave to introduce a Bill to ensure the preservation of their sources of supply; and their petition is being supported by the Carshalton Urban District Council, the Epsom Rural District Council, the owners of mills and other property on the Rivers Wandle and Hog's Mill, and the Provincial Water Companies' Association. The matter will come before the Committee to-day (Tuesday).

MID-OXFORDSHIRE GAS BILL.

Unopposed Bills Committee.—House of Commons, Thursday, April 5.

(*Mr.* ALFRED EMMOTT, *Chairman of Ways and Means, Presiding.*)

By this Bill, powers are sought, among other purposes, for the supply of gas in certain districts in Mid-Oxfordshire; the promoting Company having acquired the Chipping Norton, Witney, and other gas undertakings.

Mr. SOUTTAR, for the promoters, said the whole of the clauses which had been in the Bill with regard to the finances of the Company had been withdrawn. The clauses which remained were those confirming the agreement entered into with the Chipping Norton Gas Company, and dealing with questions arising as to the legal power of transfer, and also with the price of gas and other matters. With regard to the question of the finances of the Company, as these might be inquired into, he had prepared a short statement, which he handed to the members of the Committee.

The CHAIRMAN: Have you a copy of your Articles of Association?

Mr. SOUTTAR: Yes.

When was the Company registered?—On Oct. 10, 1905.

Sir CHANDOS LEIGH: Evidently it was registered a month or so before this Bill was deposited?

Mr. SOUTTAR: Yes.

Sir CHANDOS LEIGH: Then the Company was promoted for the purposes of this Bill?

Mr. SOUTTAR: No; the Company was formed for the purpose of acquiring these undertakings. Then there is the corollary that the Bill was floated for these purposes.

Sir CHANDOS LEIGH: What capital was subscribed at that time?

Mr. SOUTTAR: Practically none.

In reply to further questions by Sir Chandos Leigh, Mr. SOUTTAR said that upwards of £5000 had been paid by the promoters to various Companies in respect of the purchases; and three of the Companies were now actually in the hands of the promoters. Until the Company had been registered, they could not do anything.

Sir CHANDOS LEIGH: Whose money did they pay?

Mr. SOUTTAR: Upwards of £5000 has been paid away in cash for the purposes of the Company.

Mr. BRYNMOR JONES: Then it could not have been the money of this Company?

Mr. SOUTTAR: No; for the purpose of forming the Company; otherwise it would be represented by shares. That is why the capital of the Company appears so small.

In reply to further questions by Mr. Brynmor Jones, Mr. SOUTTAR explained that only 29 shares had been taken up; the object of this being technical compliance with the Companies Act. All the capital was being issued now.

The CHAIRMAN: I have the prospectus before me. The list opened on March 9 and closes on April 6. Has there been a rush?

Mr. SOUTTAR: I believe all the capital will be subscribed. He added that he was the Parliamentary Agent to the Bill. But the Solicitor to the Company was present, and could answer any questions.

Sir CHANDOS LEIGH said he did not understand the movement as to Witney. There had been a petition; but it was withdrawn.

Mr. SOUTTAR said they had bought the Witney Gas Company's undertaking; and the objection of the Witney Authority had been withdrawn, as it did not affect them as had been anticipated.

Mr. BRYNMOR JONES: The effect of this Bill will be to convert you from a mere limited liability Company to a statutory Company?

Mr. SOUTTAR said they remained a limited liability Company. The object of parliamentary powers was to give them the right to open roads for laying and repairing mains. They also fixed specified rates and prices. It was in the public interest that they should have these powers.

Sir CHANDOS LEIGH: Your aggregate population is very small. Witney is your plum?

Mr. SOUTTAR: The population altogether is about 30,000.

Mr. BRYNMOR JONES said the promoters had to satisfy them that they should have these statutory powers. They could carry on under the Companies Act. As he understood it, a certain number of gentlemen had joined together to form a joint-stock Company for a definite object, and now, by the machinery of the Acts, came before Parliament for powers to do something more than other limited companies could do.

Mr. SOUTTAR said that powers were necessary for carrying out various works. As regarded the rights of the Local Authorities, the right to acquire or purchase was the power of every local authority.

The CHAIRMAN asked several questions as to the finances and purchase of the Chipping Norton Gas and Coke Company.

Mr. SOUTTAR stated that since 1887 the Company had paid 7½ per cent. on a capital of £7180, divided into 718 shares of £10 each.

The CHAIRMAN: You put certain statements in your prospectus as to dividends earned. What amount of capital have these dividends been earned upon? Can you tell any one of them, and the purchase price?

Mr. SOUTTAR said the details could all be supplied. With regard to the Woodstock Company, the capital was 660 shares of £2 10s. each; and the amount they paid was £2425.

The Committee having deliberated for some time in private,

The CHAIRMAN said they had come to the conclusion that the Bill must be adjourned for a time, as they considered the financial position of the Company was not such as to satisfy them that the measure should be passed. If the Bill was to go on at all, the Committee would insist that the usual clauses for the sale of plant in the book (indicated) "Modern Bills and Clauses" would have to be inserted.

In reply to Mr. Souttar, Sir CHANDOS LEIGH said that, of course, they meant clauses similar to those indicated.

UNOPPOSED BILL.

The Committee of the House of Commons on Unopposed Bills—Mr. ALFRED EMMOTT (Chairman of Ways and Means) in the chair—held a further sitting on Thursday.

Uxbridge Gas Bill.

This Bill was for creating new capital and extension of limits of supply. It was proposed to increase the capital of the Company to £75,000; an increased supply of gas being necessary owing to the greater quantity consumed in the district.

The Bill was approved.

Reduction in Price.—The Sutton, Southcoates, and Drypool Gas Company have reduced their price from 2s. 6d. to 2s. 4d. per 1000 cubic feet, as from the commencement of the current quarter.

LEGAL INTELLIGENCE.

GAS-PLUG HOLES IN PAVEMENTS.

At the Westminster County Court, on Monday last week, his Honour Judge Woodfall heard, on adjournment, an action brought by Mrs. Emma Waters, the wife of Mr. John Waters, a ship transporter, against the Gaslight and Coke Company for damages for personal injury sustained through placing her foot in a gas-plug hole belonging to the Company in the pavement in the Victoria Dock Road.

Mr. Griffith Jones (instructed by Messrs. Lloyd, Humphreys, and Co.) appeared for the plaintiff; Mr. Vaughan Williams (instructed by Messrs. Monier-Williams and Robinson) represented defendants.

In her opening statement, the plaintiff said that she was walking along the footpath of the Victoria Dock Road on the 12th of December last, with her husband and daughter, when her toe caught in a hole, and she fell to the ground. She was taken to the surgery of Dr. Taylor, who bathed and bandaged her knee, and told her to go home to bed, and if worse to send for him. She kept her bed for a fortnight, and could not leave her room for two weeks more. Dr. Taylor attended her several times. She had to call people in to assist her; and she still needed their help. She suffered a good deal of pain, and her heart was bad. In cross-examination, she said she always had the best of health, had no trouble whatever with her heart, and never had a doctor. She could not kneel properly yet, except in a certain position. The husband and daughter having given corroborative evidence, George Ashworth said he was for many years in the service of the East London Water Company, whose plugs were always covered; whereas the Gas Company's were always open. The plug in question was bevelled off badly. Mr. John Pepper, a surveyor, having produced a plan of the *locus in quo*, Dr. Taylor said he examined the plaintiff on the day of the accident, and found there was no swelling, nor were there any signs of material injury; but she was certainly in a very collapsed, excited, and nervous condition. When he saw her subsequently, she complained of pain in the knee, as well as in her back and hip.

For the defence, Mr. G. F. L. Foulger, the Company's Chief Distributing Engineer, was called, who said that the plug was in a perfectly normal condition. The objection to covered lids was that the locality where the accident happened was infested with mischievous boys, who would pull up the lids and leave them, causing them to be, in his opinion, more dangerous than the open plugs, which could be filled up with dirt, or anything else. John Cooke said he attended to the syphon-boxes, and they were filled up with a bit of waste, which he generally carried with him, and paper, or whatever he could pick up on the spot. Mr. G. R. Dando, the Senior Assistant-Engineer in the New River district of the Metropolitan Water Board, said the Board had thousands of similar boxes in his district, and he considered that where there was only a small hole, 3 inches in diameter, this was the safest pattern box. Dr. Hastings stated that he examined the plaintiff in February last, and found her pretty well. There was no serious injury to the knee, and nothing wrong with the heart. In cross-examination, he said it was very probable that at the time of the accident she really suffered the injuries complained of. Mr. Norman Scorgie, M.Inst.C.E., the Surveyor and Engineer to the Hackney Borough Council, said he had more than 100 miles of roads and 200 miles of footpaths under his supervision. He had similar open boxes in his district, and always considered them to be the very opposite of dangerous.

Counsel was proceeding to address the Court, when his Honour said he must decide in favour of the plaintiff. Considering the small amount she had had to pay for medical and other attendance, he thought £25 would be enough; and he gave judgment for this amount with costs. He refused an application for a stay of execution; saying that, of course, Mr. Vaughan Williams could appeal if he pleased.

ALLEGED OVERCHARGING FOR GAS AT UDDINGSTON.

In the Sheriff Court at Hamilton last Friday, Sheriff-Substitute THOMSON had before him the action by John Turner, writer, Camphill, Uddingston, against the Bothwell and Uddingston Gas Company, Limited. The matter was before him on the 20th ult., as mentioned in the "Notes from Scotland" in the "JOURNAL" the following Tuesday.

The pursuer asked the Court "to find (1) that the defenders, in excess of the power conferred on them by the Bothwell and Uddingston Gas Order, 1902, supplied to the consumers within the area of supply defined by the Order, and to the pursuer, gas at a pressure greater than that prescribed by the Order; (2) that a demand-note, dated Jan. 30, 1906, served by the defenders upon the pursuer, in the following terms: 'To gas per meter from Oct. 30, 1905, to this date, 30,500 cubic feet, at 2s. 11d. per 1000, £4 9s.,' is not a true record of the gas consumed by the pursuer in his dwelling-house at Camphill; (3) that the sum claimed in the demand-note is not due nor payable by the pursuer to the defenders; (4) that the pursuer is entitled to relief from payment of such proportion of the sum claimed in the demand-note as the Court may, in its judgment, find to be just and equitable, after due inquiry into all the circumstances attending the supply of gas by the defenders to the pursuer, and to do otherwise in the premises as to the Court may seem just; and (5) to find the pursuer entitled to the expenses of the application."

Mr. TURNER conducted his own case; Mr. A. P. SMITH (of the firm of Messrs. Dykes, Solicitors, Hamilton) appeared for the Company.

Mr. SMITH said he had intimated to his friend that he was to ask, in the previous case for interdict, for withdrawal of the interim interdict. He thought he was entitled to this, especially after what his Lordship said on the last occasion, because his view was that this was a question merely of interim interdict; and since the present application was lodged, interdict was not required. He might tell his Lordship that the Company had not the slightest intention of cutting off pursuer's supply of gas. They never had this intention; but they objected to interim interdict standing against them, as it was admitted to be contrary to the statute law.

The SHERIFF: If you put in an undertaking, on behalf of your clients, that they will not cut off the gas supply until this question is decided, you may have it.

This was agreed to by both parties.

Mr. SMITH: Then, with regard to the interdict action, I think it had better be continued in the adjustment roll just now, because it is merely subsidiary, until the present action is disposed of. In the present action, my friend has lodged a very elaborate statement, and we are here to-day to ascertain what is to be the procedure in it. I object to his long statement as to the making of gas. I say the only relevant question is whether Mr. Turner has burned the gas; and I ask your Lordship to grant authority for the meter being sent to the Government testing-station in Edinburgh. I think I have power, under the Acts, to take the meter out and to send it to be tested; but I will put another in its place. I submit this should be the end of the case.

The SHERIFF said he could not go into the relevancy of the case that day. He asked Mr. Smith if he wished to lodge answers.

Mr. SMITH said he did, and added that there was a great deal in the petition to which he objected entirely. He thought it would be better to treat the action as an ordinary one. There were other consumers in Uddingston, not before the Court, who were using the action as a reason for not paying their accounts. They were waiting the result.

Eventually the case was sent to the ordinary roll, and continued for the answers of the Gas Company.

An Echo of an Anti-Vibrator Case.

A case of some importance was heard at the Halifax County Court last Thursday week, when Messrs. Smith and Co., woollen manufacturers, of Greetland, sued a local plumber named Sykes for the sum of £10 19s. 6d. Mr. Perks, for the plaintiffs, said that in either October or November, 1903, the defendant recommended his clients to have supplied to their mills some anti-vibrator lights. A sample light was put in; and subsequently the plaintiffs ordered 71 anti-vibrator frames at 2s. 6d. each. In December, 1904, the Anti-Vibration Incandescent Lighting Company obtained judgment for infringement against a man named Crossley, of Burnley, from whom Sykes had purchased the frames; and this judgment was confirmed by the High Court of Appeal last June. [See "JOURNAL," Vol. XC., p. 728] Following this decision, the Company commenced to collect evidence relating to the infringement of their patent; and he understood that at least one thousand claims had been made by the Company in various parts of the country. The plaintiffs were threatened by the Company; and ultimately they paid them £10 19s. 6d. damages. It was for this that they now sued the defendant. On behalf of the defendant, Mr. Leach contended that there was no patent, and if put to the test he would prove it. He also submitted that the case was out of the jurisdiction of the County Court Judge, inasmuch as the trial of validity was involved. The judgment against Crossley could not bind his client. The Judge concurred that he could not enter into the question of patent, which it was necessary for the plaintiffs to prove that they were entitled to. He gave judgment for defendant with costs. Leave to appeal was granted.

Gas Profits at Warrington.—The citizens of Warrington have received the joyful tidings that there is to be a reduction of 4d. in the pound in the rates. The result of the past year has been that there is a large sum in hand on both the borough and improvement rate accounts. So far as the borough rate is concerned, the year closed with an estimated balance in hand of £1492; while the improvement rate closed with a sum to the good of £3490—mainly, it is said, brought about by the handsome contribution from the Gas Department, which amounted to £10,407.

Water Scheme for Newtownards.—On behalf of the Local Government Board, Mr. P. C. Cowan last Wednesday held an inquiry regarding the application of the Newtownards Urban District Council for sanction to a loan of £18,500 for the purpose of providing a water supply for the town. Mr. J. H. Swiney, the Engineer for the scheme, gave details in regard to the proposal and the probable consumption. The capacity of the storage reservoir was estimated at 2 million gallons; and the supply was calculated at 20 gallons per head per day on the present population. If the town increased in population, additional storage accommodation could be made. The cost of the entire work was £15,471, to which he added 20 per cent. for land, law, engineering, and supervision expenses, which would amount to £3094, making together £18,565. There was no opposition.

Proposed Large Gasholder at Manchester.—Alderman Gibson, at the meeting of the Manchester City Council last Wednesday, said there had been two or three complaints from gas consumers at Chorlton as to shortness of gas since the Manchester Gas Committee had taken the supply over. This was to be expected; and he asked the consumers of Chorlton to be a little generous and considerate until a 36-inch main was provided. This would be in its place before next winter, and would give a pressure with which everybody would be satisfied. Mr. Fox asked that a resolution of the Committee recommending that a new 10 million cubic feet holder be erected at the Bradford Road Gas-Works should be taken back. In the opinion of some members of the Parks Committee, the building of the holder on the site proposed would interfere with and deteriorate Philips Park Cemetery; and he wished to give the Parks and the Gas Committees an opportunity of examining the proposed site and looking round before the point was finally decided. Alderman Gibson assented to the adoption of this course.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Saturday week—Mr. W. F. COTTON, D.L., J.P., in the chair.

The SECRETARY and MANAGER (Mr. F. T. Cotton) read the notice convening the meeting; and the report and accounts were then submitted. These showed that the gross revenue for the half year ended Dec. 31 amounted to £149,943; the expenditure, inclusive of interest on loan capital, &c., being £117,731. This left a balance of £32,212 as a result of the six months' working, to which had to be added £74 carried forward from the previous accounts. The Directors recommended the payment of the usual dividends at the rate of 10½ and 7½ per cent. per annum on the respective shares; and as these would absorb £35,126, it would be necessary to draw on the reserve fund to the extent of £2840. The market for residuals, especially coke, had been very depressed; and the low prices realized under this head alone had resulted in a reduction of £5940 in the receipts. The renewal and reconstruction of one of the large gasholders at the Barrow Street station, which was referred to in the previous report, had been completed satisfactorily. The Directors recorded with regret the death of Mr. Maurice Brooks, who was 32 years a Director of the Company.

The CHAIRMAN said no doubt the shareholders would have noticed the very slight increase in the gas sold during the past half year, as compared with the corresponding period of 1904. The smallness of the increase—which only amounted to about 13 millions, or 1·7 per cent.—was to be attributed to the largely increasing use of incandescent burners and to the very mild weather experienced during most of the winter. With regard to incandescent burners, the Company were doing all in their power to encourage their use. Under the heading of gas and meter rent, there had been an increase of £1347; while, on the other hand, there had been a falling off in the receipts for coke amounting to £5940. During the half year under review there have been fitted 3141 gas-cookers and 248 gas stoves and fires, in addition to sundry small apparatus. This brought the number of cookers in use on Dec. 31 to 21,157, and of heating stoves and fires to 1133. In the same period there were 375 ordinary and 2202 prepayment consumers taken on. It was with great difficulty the Company were able to cope with orders for automatic meters and installations, which in nearly every case included a cooker and from two to three lights. The Company believed there was great scope for expansion in this branch of the business. At the last meeting the shareholders were informed that it became necessary to renew and reconstruct one of the large holders at the Barrow Street station. This work was completed in November, since which the holder had been working most efficiently, giving every satisfaction to the Company's officers. The heavy expenditure incurred in carrying out this work—about £20,000—being a charge against revenue, the Directors considered it should be written off by annual instalments; and for this purpose they propose to form a suspense fund. Recently a very radical change had been introduced into gas legislation. In London and many of the large cities and towns the standard for illuminating power had been reduced from 16 to 13 and 14 candles, when tested by a standard argand burner—a burner which had been specially constructed for obtaining from the gas the greatest possible amount of light. Several circumstances had led to this change; but he would confine his remarks to two. By the use of the incandescent burner, the light from gas of low illuminating power could be increased almost to any extent; hence there no longer existed the necessity for enriching coal gas by the use of oil or cannel. Low-grade gas, consumed in an incandescent burner, was capable of producing about six times the light given by the ordinary flat-flame burner for the same consumption, in addition to improving the atmosphere of the room where it was burnt. The combustion being more perfect, there was an absence of what was known heretofore as smoke or soot. Before the introduction of the incandescent burner, it was a common complaint that in rooms lighted by gas the ceilings became soiled more frequently than where other means of artificial light had been resorted to. However, there no longer remained any foundation for complaint upon this head. Two of the most important constituents of coal gas for lighting purposes were carbon and hydrogen. When these substances were completely burned with the proper use of an incandescent burner, they gave rise in the course of combustion to a slight vapour of water and carbonic acid gas, neither of which produced smoke or dirt. Another strong reason which induced the Legislature to reduce the standard of illuminating power was that gas was now largely used for cooking and heating, neither of which purposes required it to be of high illuminating power. The Directors had every reason to believe the Company had a prosperous time before it, having now the advantage of a gasholder capable of giving a supply at a pressure sufficient for the use of incandescent burners in the outlying townships—a want which had been felt for some time past. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. J. Murphy) seconded the motion.

Mr. J. J. MAGUIRE observed that in the twelve months ended June 30 the capital expenditure had increased by £60,000; and he thought the Board should be very careful in this matter. Items were charged to capital which ought in his opinion to go to revenue—such as fittings and cookers. The capital charges should be kept as low as possible, having regard to the amounts of the dividends. To maintain the rate of distribution on the present occasion, it was necessary to draw upon the reserve. Twelve months ago the bank overdraft was only £18,000; while since then it had increased to £64,000.

The CHAIRMAN remarked that the overdraft had now been paid off by means of an issue of capital. Under their Act of Parliament, they were bound to charge the items to which Mr. Maguire had alluded to capital. They could not go on supplying an increased number of consumers without having these charges. The reserve fund, which had been alluded to, was ear-marked for the purpose of equalizing the dividends, and could be used for no other purpose. The new meters had to be charged to capital.

Mr. MAGUIRE: I understand that you had the option of charging them to revenue.

The CHAIRMAN: We have no such option. We have to submit our accounts to the Board of Trade. We cannot extend our business without increasing our capital.

Mr. MAGUIRE: What about the increase in the price of gas? It has been discussed for some time.

The CHAIRMAN: The matter is in the hands of the Directors; and I cannot answer you. If you want information on the subject, you had better write to them.

The report and accounts were unanimously adopted, and the dividends recommended were declared.

SWANSEA GAS COMPANY.

Presiding at the Meeting of the Swansea Gas Company on Friday, Mr. T. Travers Woods congratulated the shareholders on a successful half year, notwithstanding the depression in trade generally. The receipts and expenses showed a balance of £11,862 gross profits for the six months; and after payment of interest, depreciation, &c., there was a net balance of £9907. The usual dividend at the rate of 5 per cent. per annum, would absorb £7425, so that a sum of £2482 would be left to be carried forward to next half year. There had been a slight increase in the cost of coal, but the receipts for products had been satisfactory. The number of consumers and stoves at the present time showed a very large increase since the Swansea Gas Order of 1898 was obtained. This Act enabled the Company to instal coin meters and fittings; and these had been highly appreciated by all classes of the community. There were now a total of 6661 ordinary and 7462 coin-meter consumers—or a total of 14,123 consumers—and 6606 gas cooking-stoves. The Directors regretted to record the death of Mr. W. Stone, who had been on the Board of the Company for twenty years, and who had always been most diligent in his duties as a Director. The Directors wished to point out that on June 1 next it would be fifty years since their Engineer and Secretary (Mr. Thornton Andrews) had entered upon his duties; and it was to his untiring energy, consummate ability, and perseverance that the marvellous success enjoyed by the Company was largely to be attributed. The occasion was one which Mr. Woods thought they ought to celebrate; and he trusted the shareholders would propose a resolution authorizing the Board to make such recognition of Mr. Andrews's jubilee as they thought fit. A resolution confirming this suggestion, together with the report, was passed.

THE GAS QUESTION AT NOTTINGHAM.

Sir George Livesey Called in.

At the Monthly Meeting of the Nottingham City Council on Monday of last week, Mr. Harlow, the Chairman of the Gas Committee, referred to the report on the gas undertaking which he had promised should be brought up at that meeting, but which was not forthcoming. He said the Gas Committee appointed a Sub-Committee to prepare such a report; and they had many meetings. They, however, met with a considerable number of difficulties, upon which they could form no reliable opinion without having expert advice. They therefore reported to the Gas Committee that such advice was necessary, and that it should be given by the highest authority. The Committee therefore authorized an application to be made to Sir George Livesey to visit Nottingham and undertake to inspect and report on the gas undertaking and its management. Sir George Livesey had visited the works during the past week; but they had no report from him at present, and did not expect one for some days. From these circumstances and from the issues involved, which were of the gravest character, the Gas Committee were not prepared to report to the Council that day. As soon, however, as Sir George Livesey's report was received, the Gas Committee would be called together for its consideration; and the matter would be then reported upon to the Council at as early a date as possible.

WEST BROMWICH GAS UNDERTAKING.

A Successful Year.

The gas undertaking of the West Bromwich Corporation has had another successful year, and, as a result, the Committee have been able to hand over £1365 in relief of the rates. There has been no allocation of gas profits in relief of the local rates since 1901, when the Town Council passed a resolution requesting that no grants should be made until such time as the capital per 1000 cubic feet of gas sold was brought within safe limits. A return has been prepared showing that the financial position of the undertaking has been greatly improved owing to the passing of the resolution. Since 1901, the net profits have been £19,414. This is the net amount after interest and sinking fund charges have been paid. The sinking fund alone, which has been allocated in redemption of the debt, amounts to £18,849. In addition to this, there has been expended on the Mill Farm purchase £4150; and the Gas Committee have provided the Corporation with £2300 for new offices. They have reduced their capital to £17,602; but this is less the amount they have spent on capital account out of the profits of the concern—viz., £8865. The bulk of this sum might have been raised by loan; but the Committee considered that the best thing to do was to consolidate the concern, and place it on a thoroughly sound basis. All the extensions since 1901, both of the works and mains, have been paid for out of revenue; and this has considerably strengthened the position of the undertaking. In 1901, the capital per 1000 cubic feet of gas made was 11s. 8d.; while it is now 9s. 1d.—a reduction of 2s. 7d., or equivalent to something like 22 per cent.

A LARGE REDUCTION IN PRICE AT FENTON.

The Fenton Urban District Council have adopted recommendations of the Gas Committee that the whole of the gas for public lighting should be supplied free of charge, subject to the Council paying for all repairs, renewal of lamps, mains, &c., and the lamplighters' wages; that the price of gas should be reduced by 6d. per 1000 cubic feet, in the shape of a rebate of the present gross charge of 3s. 4d., both to slot consumers and ordinary consumers who pay their accounts within a month; and that gas for motive power (where the consumption is not less than 250,000 cubic feet per annum) be subject to a rebate of 10d. per 1000 feet if paid for within a month.

The Chairman (Mr. J. Shenton), in moving the adoption of these recommendations, remarked that it would appear to outsiders that this was rather a large reduction; and some people might have wondered how it was that they had been charging higher prices up to now. Most of the members who were on the Gas Committee eight years ago came to the conclusion that something like £13,000 was invested in the undertaking more than the works were worth. The Committee then set about equalizing their assets; and this they had now almost, if not actually, accomplished. So that by reducing the price of gas by 6d., they would be quite safe, and would have an estimated profit next year of something like £300. The consumers were not getting all the benefit. The works would still make a large contribution to the rates in the shape of gas supplied for public lighting. The Council would no longer be under the reproach that they charged more than a private firm would charge consumers; for he did not think there was any private firm within a radius of twenty miles that would be doing so well for the consumers. In Fenton, the consumer and ratepayer were practically identical; and if the Council were not supplying gas for public lighting free, they would be able to sell to consumers at the low price of about 2s. 4d. per 1000 cubic feet.

THE PUBLIC LIGHTING OF DUBLIN.

Cost of Gas and Electricity.

The Estates and Finance Committee of the Dublin Corporation have presented their report on the estimates of receipts and expenditure of the several Committees for the year ending March 31, 1907. Those relating to the public lighting present several features of interest. The estimate of the cost for gas is £6677, compared with £6488 for the year just closed, and an expenditure (estimated) of £6477. The Committee were disposed to recommend a reduction of the first-named amount, which is £200 in excess of the expenditure in the past year; but having regard to the action of the Gas Company in raising the price of gas (to which reference has already been made in our columns), they decided to let the figure stand. For the repair and maintenance of the lamps, the sum of £856 is put down, against £700 estimated and £769 expended in the past year. The Committee think there is no justification for this increase; and they recommend that the estimate should be reduced to £800. An item of £172, provided for the removal of public lamps, might, they think, be reduced to £125; and one of £210, for the provision of new lamps, to £100. The total is £10,327, compared with £9917 estimated and £9901 expended for the past year. The amount set down as the cost of lighting the public lamps by electricity is £10,916, against £10,714 estimated for the year 1905-6. The increase is explained to be due to the provision of additional lamps which will be required in one of the streets when certain new buildings are completed. The difference in the amount to be expended in the current year on the two systems of lighting is £589; and it will go to the provision of electric lighting. It is not a very large sum, it is true; but when it is stated that this system of lighting is employed for only one-fifth of the city, whereas gas does duty in the remaining four-fifths, the economy of one illuminant as compared with the other will be readily appreciated.

GAS PREFERRED TO ELECTRICITY.

The Windsor Royal Gaslight Company and the Windsor Electrical Installation Company have been holding their meetings; but while the former decided on the payment of the full authorized dividends, the latter have reduced their distribution to 5 per cent. per annum, as compared with 8 per cent. for 1903, and 7 per cent. for 1904. The Directors of the Gas Company are able to state that the business "continues to maintain its satisfactory condition;" and, on the other hand, it is easy to gather evidence that the consumers of electricity are dissatisfied. We learn that most of the hotels in the town have gone back to incandescent gas lighting, as they say they cannot afford the excessive cost, when they do not get a correspondingly good light. Five out of seven churches and chapels have also adopted incandescent gas lighting; while the Liberal and Conservative Clubs some time ago reverted to gas—both declaring that they got a much better light from gas at about half the cost of electricity.

At the recent meeting of the Cromer Gas Company, too, which was briefly referred to in last week's "Journal," Mr. Percy Griffith, the Consulting Engineer, said there had been an increase of 4·3 per cent. in the sale of gas, which must be largely the result of reversion from electric to gas lighting. Consumers who had adopted electric light were, he found, going back to the use of gas. He had called for a report, and had been pleased to hear that since the end of the year 120 gas-lights had been fixed in place of electric lights. Without saying anything that would be considered unkind to their electrical friends, he thought the position and the circumstances justified the comment that gas was being preferred to electricity. The Gas Company and their Manager (Mr. W. H. Archer) are certainly in a position to do the best for the town and for the shareholders; the sale of gas per ton of coal carbonized being 10,029 cubic feet, while the profit on revenue account is 1s. 7d. per 1000 cubic feet of gas sold.

INCANDESCENT GAS LIGHTING IN SCHOOLS.

The London County Council had before them, at their meeting last Tuesday, two recommendations in regard to incandescent gas lighting in schools under their control. In this report, they set forth that the gas lighting at sixteen schools is at present unsatisfactory, and that provision in respect of the expenditure necessary to improve it had been made in the vote on account of the maintenance estimate 1906-7. The Committee recommended that the gas lighting at the schools in question (the names of which were given in a separate statement) should be rearranged; that incandescent gas-burners should be provided; and that expenditure not exceeding £1621 should be sanctioned for the purpose. The recommendation was adopted.

The Committee also reported on the lighting of the officers' reading-room at Feltham Industrial School. At present there are 20 burners in use, and their estimated total consumption per hour is 120 cubic feet. The Committee proposed that these burners should be replaced by six incandescent burners consuming a total of 24 cubic feet per hour; and they gave instructions to this effect. The consumption under the new arrangement will therefore be one-fifth of what it is under the existing conditions. The total consumption for the year ended Sept. 30, 1905, was 47,500 cubic feet; and the annual consumption in the future should therefore be 9500 feet. The Council on the 23rd of January last, when fixing the maximum annual quantity of gas allowed for consumption at each set of officers' quarters at Feltham, fixed 47,000 cubic feet as the maximum for the reading-room, and decided that the officers concerned should be required to pay to the Council the cost of any gas consumed in excess of this quantity. They recommended that this resolution should be rescinded, and that the maximum quantity of gas allowed for consumption in the reading-room should be fixed at 10,000 cubic feet—the officers to pay for any excess. The recommendation was agreed to.

INCANDESCENT GAS LIGHTING FOR MARKETS.

It is not very long since an opinion prevailed in certain quarters that for the lighting of large covered areas, such as railway stations, public halls, and markets, there was nothing to equal electric arc lamps. Of late, however, various events have occurred—not the least important one being the display at Earl's Court not quite eighteen months ago—to dispel such a notion. Our readers know what the Gaslight and Coke Company have done at Victoria; last week we made reference to Mr. Troughton's achievement in the Newmarket Town Hall; and to-day we are in a position to record two successful examples of market lighting—one in the Provinces, the other in a London suburb.

Longton, in Staffordshire, is said to possess one of the largest covered public markets in the kingdom; and the lighting of such an extensive space is attended with various difficulties. Much of the trouble has, however, lately been overcome. It was acknowledged that the lighting of the place greatly needed improvement; and the Borough Gas Engineer (Mr. W. Langford) was asked some time ago to report upon the subject. He submitted alternative estimates for electric arc lighting and for gas; and eventually the latter was decided upon—the principal reason for the choice being that with gas there would also be an appreciable warming of the atmosphere. The original estimate for a new installation of fittings amounted to £269; but it was reduced to £248, and the work was carried out. The effect has been to produce, according to a local paper, a "dazzling reformation." The old and primitive coronas, each carrying 12 three-spray flat-flame gas-burners, have been replaced by the latest type of Welsbach self-intensifying burners. The main avenues are lighted with upwards of 40 of them, each of 600-candle power; and the enclosed portion of the market under the Town Hall—formerly, in its dim light, a very sepulchral-looking area—has been considerably lightened by the introduction of 30 self-intensifying burners, each of 300-candle power. The result has been a splendid equal diffusion of light through the whole of the market. Mr. Langford's efforts have met with general appreciation, more especially by the stall-holders; and a gratifying fact for the ratepayers is that the improvement in the lighting of the market will not entail any increased expense. In fact, the consumption of gas under the new system is not half what it was under the old one, while the lighting power is more than trebled. Between 40,000 and 50,000 cubic feet of gas are saved each week, which means that the Markets and Baths Committee will be recouped for the outlay in a comparatively short time; while the illumination secured is stated, by those who have seen it, to be second to none in the country for a large area lighted by gas.

The other example is furnished by the new Brentford Markets, at Kew Bridge. These have just been completed by the Brentford Urban District Council, and the Keith light has been installed in them. The Council, with their Surveyor Mr. N. Parr, met last Tuesday night to inspect the lighting. Considerable time was spent in the markets; and we are informed that complete satisfaction was expressed by all present. The markets are fitted with twenty-four 600-candle and three 900-candle "arc" lamps, suspended from the roof tie-rods; and there are six 300-candle lamps hanging from wall-brackets in the outer markets, to light the yard. The compressing plant consists of a No. 4 Keith water-driven enclosed pattern compressor. The plant was installed and the work carried out by the Brentford Gas Company.

Halifax Water Committee and Free Baths.—The Halifax Water Committee have appointed a Sub-Committee to consider the advisability of restoring the charges for baths and closets in dwelling-houses, which were remitted prior to the Corporation embarking on the Walshaw Dean scheme, and at a time when a substantial revenue was being derived from the water-works. It was suggested in the course of the discussion on the budget by the Town Council that, in view of the present financial condition of the undertaking, this concession should now be withdrawn, which would mean an increase of about £2000 per annum in the revenue of the department.

TRADE UNIONS AND THE LAW.

A representative of the "Daily Mail" has sought an interview with Sir George Livesey on the subject of the new Trade Union legislation; but apparently from the moderate extent of the report of the interview, Sir George gave his views in a nutshell. This is the published version of what transpired:

Sir George declared that the picketing section, to which he particularly objected, was outrageous, and, on the face of it, an absurdity. "I have said this," continued Sir George, "and I shall repeat, if they want to 'give or receive information or peacefully persuade,' let them be content with sending one or two men outside the gates of the premises where the strike is on, and not be allowed to attend in any large body outside any man's house. To talk of attending in large numbers outside any man's house 'to give or receive information, or peacefully persuade,' is nonsense. The attendance of a large body of men at such a place can only be for one purpose—intimidation of the man, his wife, and children. That is the worst and most cowardly part of the picketing system."

In a letter to the "Times," Sir Godfrey Lushington asks: "Does the House of Commons know what it is about in giving a second reading to Mr. Hudson's Bill on Trade Union disputes? Does it realize that the effect of the principal clause—

3. An action shall not be brought against a Trade Union or other association aforesaid for the recovery of damage by any person or persons by reason of the action of a member or members of such Trade Union or other association aforesaid—

is that, if a Trade Union dynamites its adversaries or expels them by violence, or burns down a mill or wrecks a train, the funds of the Union—perhaps the very funds by means of which the outrage has been committed—shall be exempt from liability to make reparation, and that, collective liability being thus excluded, and individual liability in the case of workmen being nominal only, Trade Unions shall, so far as civil remedies are concerned, be licensed to commit any wrong whatever?"

Labour members (the Parliamentary Notes writer of the "Daily Telegraph" says) are eagerly discussing in the lobby a suggestion by Professor Westlake that the liability clause of the unofficial Trade Disputes Bill will not hold water with the Judges. It is said that, in spite of the clause, actions could still be maintained against Trades Unions under the law of agency. It appeared to be taken for granted that there was a great deal in the contention of the learned Professor, but that means could be found for surmounting the difficulty by dropping the section in Mr. Hudson's Bill [see above] and adopting one in the measure promoted by Sir Charles Dilke in conjunction with Mr. Keir Hardie. The clause explicitly provides that "an action shall not be brought against a Trade Union, or against any person or persons representing the members of a Trade Union, in his or their representative capacity."

THE NEW WATER-WORKS FOR MALVERN.

In the "JOURNAL" last week (p. 62), we noticed briefly the inauguration, by Lady Grey, of the works which have lately been completed for affording a more abundant supply of water to the Malverns. The ceremony took place at the British Camp, where a large company assembled. The proceedings were opened by Colonel Twynam, the Chairman of the Water Committee of the Urban District Council, giving some particulars of the scheme; after which Lady Grey performed the ceremony of turning on the water, and the works were declared open. A vote of thanks was accorded to her ladyship, and Sir Henry Grey (who is the Chairman of the Council), on her behalf, thanked the Company for their kindness.

The water question has been a source of anxiety to Malvern for some years. In 1895, a scheme for collecting water on the hills was carried through at a cost of upwards of £60,000. Its success depended upon a certain average rainfall; and the Engineers, relying upon the figures for the previous twenty years, calculated upon a yield of between 40 and 50 million gallons annually. The years following the opening of the reservoir were times of comparative drought, and again the Council had to seek fresh sources of supply. A borehole was sunk in the new red sandstone at Malvern Link; but the quantity of water tapped did not suffice for the needs of the district, and last year power was obtained from Parliament to tap the same source at the south end of the Malvern range. This has now been done, under the superintendence of Mr. W. O. Thorp, the Water Engineer and Surveyor to the Council, with highly satisfactory results. The yield from the boreholes is 900,000 gallons in 24 hours.

The boreholes and pumping-station are at Bromsberrow Heath, some eight or nine miles distant. Water is drawn from two openings, each 15½ inches in diameter, sunk to a depth of 200 feet. They are 40 feet apart, and are lined with steel tubes to a depth of 60 feet; the water rising within 31 feet of the surface. The pipe-track is laid with 10-inch cast-iron mains, specially cast in three thicknesses for the work; its length is 5¾ miles. Automatic air-valves are provided, and a valve is fixed to relieve pressure when the pumps are standing, or to check the flow in case of a burst pipe. The main is divided into 17 sections by sluice-valves. Water is discharged into the British Camp storage reservoir, or into the clear-water reservoir below, as may be required; and it flows to the town by gravitation.

The buildings are: An engine-house, 45 ft. 6 in. by 25 ft. 6 in.; boiler-house, 25 ft. by 22 ft.; and coal-store, 24 ft. by 14 ft. The engine-house contains two deep well pits above the boreholes, also two surface tanks under the floor, each holding 8000 gallons. The engines are about 120 brake-horse-power, of the compound coupled type. The high-pressure cylinder is 15 inches in diameter; the low-pressure one, 28 inches, with 26-inch stroke at 58 revolutions per minute; and the double fly-wheel is 7 ft. 6 in. diameter. The steam pressure is 130 lbs. per square inch. The well pumps in each borehole, 80 ft. from the surface, are 12 inches in diameter and 30-inch stroke, running 25 revolutions per minute, and lifting nearly 900,000 gallons per day. The surface pump is of the horizontal treble-ram type, 7 inches in diameter and 12-inch stroke. There are two boilers, 28 feet long and 7 feet in diameter, working at a pressure of 130 lbs. They are constructed of §-inch Siemens-Martin steel plates. A Green economizer is fixed in the main flue, for supplying the boilers with feed-water at boiling-point, thus utilizing the waste heat from the furnaces. A Venturi meter is fixed in the engine-room, to automatically register on a clockwork diagram the hours the pumps are working, the quantity of water passed, and the pressure—making a continuous record.

The total cost of the works has been about £20,000. The Royal Assent to the Council's Bill was obtained only a little more than seven months ago; so that the whole of the work has been completed in the short space of six months.

NEW WATER-WORKS FOR SELBY.

The provision of an adequate supply of water for Selby has for some time been a source of anxiety to the Urban District Council; but on Thursday, the 29th ult., the members had the gratification of witnessing a ceremony which afforded evidence that all trouble on this score will soon be dispelled. The function alluded to was the laying, by the Chairman of the Council (Mr. Scott) of the foundation stone of the new water-works, the result of the combined labours of Mr. Percy Griffith, M.Inst.C.E., and Mr. R. B. M'Gregor Gray, the Manager and resident Engineer-in-Charge.

The company assembled shortly after three o'clock, and prior to the ceremony Mr. Gray deposited in a cavity beneath the stone a bottle containing the necessary records. Thereupon, Mr. Sharpe (of the firm of Messrs. Parker and Sharpe, of York, the Contractors) presented Mr. Scott with a handsome silver trowel and mallet, at the same time expressing the hope that he might long be spared to see the success of the work he was that day initiating. Mr. Scott then proceeded with the ceremony, and declared the stone "well and truly laid." He referred to the troublous times through which Selby had passed in connection with Leeds, and said he hoped the stone which had been laid in peace would remain for generations. It was the foundation stone of the pumping-station, which would contain the engine-room, boiler-house, coal-shed, and the necessary out-offices. It constituted a block 85 feet by 55 feet and the engines and pumps would be duplicated. The former would be of the triple-expansion surface-condenser type, of 70 indicated horse power; while the boilers would be Messrs. Davy, Paxman, and Co.'s "Economic." The two boreholes were each 400 feet deep, yielding 32,000 gallons of water per hour, and capable of supplying twice this amount. As the present supply to the town was from 8000 to 9000 gallons, the yield was equal to four times this quantity; and it would, if necessary, supply the town should it grow to have a population of 70,000. With regard to the Engineers, Mr. Percy Griffith was a most able man; and he was splendidly supplemented by Mr. Gray.

The company then proceeded to the top of Selby Barff, where Mr. Ullathorne, the Vice-Chairman of the Council, cut the first turf of the reservoir. He said that if anything went wrong with the existing works, the town had about half-a-day's supply in hand; but the reservoir now commenced would furnish from four to five days' supply, while land had been acquired which would enable them to double their storage in case of the development of the town. The reservoir would be 127 ft. by 103 ft., and 10 ft. 8 in. deep. It would be built of bricks on concrete, and lined with bitumen sheeting. Everything that modern science could contrive had been done to make the tank not only water-tight, but proof against the infiltration of surface impurities. The Council had been very successful in the appointment of their Engineers; and in selecting their Contractors they had been guided by their reputation, and had not always accepted the lowest tender. He trusted they would be successful with their work. As this was the last contract to be let, he might mention that in no case had the Engineer's estimates been exceeded.

The two contracts, for the buildings and the reservoir, amount to between £8000 and £9000. The Contractors for the laying of the mains are Messrs. Egan Bros.

THE LINCOLN TYPHOID EPIDEMIC.

Local Government Board Report.

There has just been issued the report of Dr. R. J. Reece, the Medical Inspector of the Local Government Board, on the typhoid epidemic from which Lincoln suffered during the end of 1904 and the opening months of 1905; and it contains strong criticism of the water supply of the city, as it existed at the time of the outbreak.

After indicating the rise and fall of the epidemic—which resulted in 119 deaths in Lincoln, 3 in Bracebridge, and 3 in New Boultham—Dr. Reece considers the origin. In this connection, he says, the condition of individual dwellings and their surroundings might be dismissed from the calculation, as not conceivably serving to account for more than a fractional portion of the epidemic. There therefore remained milk, sewerage and drainage, and water supply. So far as milk was concerned, the facts ascertained failed to suggest that it played any part as a distributor of the infection. In the matter of sewerage and drainage, several facts, while not inconsistent with sewerage conditions having played some part in the propagation of enteric fever in the invaded areas, did not support the view that in them was to be found the source of the epidemic. Indeed, the very manner of inception of the outbreak would seem to negative such a hypothesis. On the other hand, the behaviour of the outbreak was consistent with a theory of water-borne infection. The occurrence of

a few cases of enteric fever, widely distributed, and followed at no long interval by sharp and sudden increase of attacks, rapidly culminating in an outburst of explosive intensity, were features that had been frequently noted in association with epidemic prevalence of this disease when caused by specific pollution of a public water supply. In Lincoln and the suburbs, not only was the fever prevalent throughout the populous area almost wholly served by the city water supply, but it was associated with the distribution of this supply outside, though in but small amount, in a sparse population. This fact, and the manner of inception and progress of the outbreak, afforded ground for presumption that the public water supply of the Corporation of Lincoln was concerned in the dissemination of the fever. After referring to the circumstances of the supply, to which washings from manured ground, farmyard drainage, domestic sewerage, and other polluting matters could gain access, he points out that the amount of "purification" of the water likely to be afforded by the inadequate and irregular filtering arrangements, shown to have existed at the water-works, was probably still further diminished by occurrences of frost during January and December. Reviewing the facts and considerations of the case, he says they may reasonably be held to justify the inference that the fever which affected the City, Bracebridge, and New Boultham, owed its origin to specific pollution of the public water supply, shared in by these places; and that this supply was the medium whereby the infection was transmitted in the large majority of the cases during the epidemic which ensued. He, however, asserts that, whatever may have been the sins of commission or omission of their predecessors, the Corporation, ably supported by their officers and by the citizens, in the hour of trial did their duty, and dealt with the varying circumstances of the epidemic in a resolute, prompt, and efficient manner.

In a lengthy appendix to the report, Dr. Reece gives a short history of the water-works from their inception in 1847 (previous to which the inhabitants obtained their supply from wells, the Witham, and the Sincil Dyke); adding full particulars of the filtering area at the time of the outbreak, the pumping power, service reservoirs, &c. He also deals at some length with the contaminated sources of water supply, the discontent of the inhabitants when the outbreak occurred, the action of the Corporation, and in general with matters as they stood in regard to the water supply at the time the epidemic broke out.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

If I were called upon to produce a weekly report upon the state of business in the world of gas supply, what I should be obliged to write at the present time would be that affairs are in an exceedingly active condition. Every week brings one or more events of more than usual importance; and, so far as can be seen, the end is not yet, for there are prospective engagements which will occupy several more weeks. This week the leading event has been the Informal Meeting of Scottish Gas Managers. The meeting was the twenty-third of the series of unique gatherings begun on the initiative of Mr. J. M'Gilchrist, of Dumbarton. For some time but little attention was paid to the meeting; but for the past fifteen years, or thereabout, it has been recognized as one of the stated meetings of managers in Scotland. It has been growing steadily in importance till now, judging by this year's meeting, it is the most important gathering of managers in these parts. There are about 245 gas managers in Scotland; and of these about half found their way to Glasgow last Wednesday, which was a goodly proportion, when it is considered how far some have to travel. A pleasing feature of the Informal Meetings is the recognition they receive from, and the assistance furnished by, the managers of large works, whose experiences upon the various points which crop up are invaluable. In respect of these services, the smaller gas managers are under a debt of deep gratitude to such gentlemen as Mr. Alex. Yuill, of Dundee, Mr. W. Ewing, of Greenock, and Mr. W. B. M'Lusky, of Perth, as well as to others. The meeting this year was particularly noteworthy in this respect. The subjects discussed were of the practical sort, as distinguished from the scientific. This is a characteristic of the Informal Meetings, which move most freely upon the lines of the giving and receiving of advice upon methods of working, leaving to more formal meetings the expiscation of chemical and engineering problems. It is possibly this outstanding feature which makes the Informal Meetings so popular; for the audiences are mostly composed of the managers of small works, for whom weightier matters are more of an academic than any other interest. It is only fitting to acknowledge here that the President—Mr. W. M'Crae, of Falkirk—rightly interpreted the purpose of the meeting, and gave an address which was in all respects most appropriate to the occasion. There were no managers from south of the Border present; and the only circumstance of a novel description which may be noted was the presence of representatives of both Districts of the Scottish Junior Gas Association.

In the action by Mr. John Turner against the Bothwell and Uddingston Gas Company, Limited, with reference to an alleged overcharge for gas consumed between October and January last, the parties were to have been heard before the Sheriff-Substitute at Hamilton yesterday; the intention being that the case should be disposed of summarily. But a different course has been adopted, and the proceedings will now go forward in a more leisurely fashion. [A report of what took place will be found on another page of the "JOURNAL."] It is not open to me to go further into the case until it passes the stage of adjustment, when the statements of the parties will be fixed. But in view of the statement of the Pursuer, which has been lodged, being open to adjustment, I hope opportunity will be taken to make more correct the remark to the effect that during the year ending April, 1905, the Gas Company produced over 100 million cubic feet of gas, and only sold to the consumers close upon 49 million cubic feet. Upon this statement a theory is established which speaks of gas being lost—it is not said how—to the defenders. Whence are these figures obtained? Strangely enough, from the Government returns as to gas undertakings. In the return relating to companies for the year to Dec. 31, 1904, the quantity of gas manufactured by the Bothwell and Uddingston Company is given as 89,720,000 cubic feet, and the quantity sold as 48,559,000 cubic feet. It is quite evident that the sale should have been 88 millions. A typographical error has been made, which has already led to a misconception. Its removal would simplify the case, and shorten it also. It was in 1902 that the Company obtained their Order. Since then their returns for 1903 and 1904 only have been published—those for 1905 are not yet due; and the same mistake has been made in the Government returns for both years.

The period for the redemption of corporation stocks has been raised

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 91.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	21½—22½	..	4 13 4
160,000	10	,,	7½	Do. 7 p.c.	15—16	..	4 13 9
200,000	5	Nov. 15	7	Bombay, Ltd.. . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Mch. 9	14	Bourne- 10 p.c. . .	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas B 7 p.c. .	16½—17½	..	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	262—267	..	4 13 8
300,000	,,	,,	9½	Do. New . . .	195—200	+3	4 15 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	123—128	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Mch. 9	11¼	Brighton & Hove Orig.	230—235	..	4 15 9
246,320	,,	,,	8¼	Do. A. Ord. Stk. .	163—168	..	4 18 3
460,000	20	Sept. 28	10	British	43¾—44¼	..	4 9 10
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c. .	120—123	..	4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c. .	91—94	..	4 15 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12½—13	..	5 7 8
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
150,000	20	Mch. 9	8¼	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Oct. 27	4½	Do. 4½ p.c Pref.. .	10—10½	..	4 5 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Feb. 22	5⅛	Commercial 4 p.c Stk. .	114—116	..	4 9 7
560,000	,,	,,	5	Do. 3½ p.c. do. .	111—113	..	4 8 6
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	129—132	..	4 18 6
200,000	,,	,,	7	Do. 7 p.c Pref.	143—148	..	4 14 7
432,070	Stk.	Feb.	5½	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	108—110	..	3 12 9
486,090	10	Jan. 25	11	European, Ltd. . . .	23—24	..	4 11 8
354,000	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 8
15,223,235	Stk.	Feb. 8	4⅘	Gas- 4 p.c. Ord. . .	98—99	+½	4 8 11
2,600,000	,,	,,	3½	light 3½ p.c. max. . .	88—90	..	3 17 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	108—110	..	3 12 9
4,193,975	,,	Dec. 14	3	Coke 3 p.c. Con. Deb.	88—90	..	3 6 8
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	98—102	..	4 18 0
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Oct. 13	11	Hongkong & China, Ltd.	20—21	..	5 4 9
3,800,000	Stk.	Nov. 15	10	Imperial Continental .	232—234	..	4 5 6
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	+1	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c. .	121—126*	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A . .	235—237	+1	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B .	163—170	+1	4 2 4
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd. .	4¼—4¾	..	5 5 3
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb..	101—103*	+½	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104*	+¼	4 0 7
541,920	20	Nov. 15	3½	Monte Video, Ltd. . .	11½—12½	..	5 12 0
1,675,892	Stk.	Feb. 22	4½	Newc'tle & G'tesh'd Con.	107—109	..	4 4 10
406,025	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19—20	..	5 0
52,940	10	,,	7	Do. 7 p.c.	12½—13½	..	5 3 8
300,000	Stk.	Nov. 30	8	Oriental, Ltd. . . .	150—153	..	5 4 7
600,000	5	Mch. 28	7	Ottoman, Ltd. . .	6—6¼*	..	5 7 8
398,490	5	Apl. 28	7†	Primitiva Ord. . . .	7—7½	..	4 13 4
796,980	5	Jan. 25	5	Do. 5 p.c. Pref. .	5¼—5½	+⅛	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	98—100	..	4 0 0
851,070	10	Oct. 13	7	River Plate Ord. . . .	13—13½	..	5 3 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	98—100	..	4 0 0
250,000	10	Mch. 28	8	San Paulo, Ltd. . . .	14—14½*	..	5 8 6
70,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	50—52	..	4 16 2
135,000	Stk.	Sept. 14	10	Sheffield A	248—250	..	4 0 0
209,984	,,	,,	10	Do. B	248—250	..	4 0 0
523,498	,,	,,	10	Do. C	248—250	..	4 0 0
126,106	Stk.	Mch. 9	5½	Shrewsbury Ord. 5 p.c.	108—118	..	4 13 3
70,000	10	Sept. 28	10	South African	16—17	..	5 17 8
6,250,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	127—129	..	4 5 3
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	88—90	..	3 6 8
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—130	..	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	Nov. 15	5	Southampton Ord. . .	109—112	..	4 9 3
120,000	Stk.	Mch. 9	6½	Tottenham A 5 p.c. .	124—127	..	4 18 5
563,020	,,	,,	4½	and B 3½ p.c. .	99—102	..	4 13 2
137,500	,,	Dec. 14	4	Edmonton 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	10¼—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Feb. 22	7½	Wands- A 5 p.c. . .	—	..	—
255,636	,,	,,	6½	worth B 3½ p.c. . .	133—136	..	4 11 11
75,000	,,	,,	5⅛	and C 3½ p.c. . .	110—113	..	4 16 0
£9,416	,,	Dec. 29	3	Putney 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Mch. 9	5⅛	West Ham 5 p.c. Ord. .	107—109	..	4 14 0
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—125	..	4 0 0
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	106—109	..	3 13 5

Prices marked * are "Ex. div."

† Next dividend will be at this rate.

in connection with the finances of the Corporation of Tynemouth; and the question has spread into Scotland. The Finance Committee of the Glasgow Corporation reported to the Town Council on Thursday that the City Registrar had received an inquiry from a holder of the City of Glasgow redeemable stock as to the view which the Corporation held with reference to the redemption of the various issues of that stock which have been made by them under the powers of the Glasgow Corporation Loans Act, 1883; and, for the information of the holders of the stock, and the public generally, the Committee authorized the Registrar to reply that the Corporation entertained, and had all along entertained, the view that the term "redeemable," which occurs in the certificates of the stock, implied not only an obligation upon the registered holders of the stock to take, but also an obligation upon the Corporation to make, payment of the capital amount of each issue at the respective periods stated in the certificates. This action was approved by the Corporation. Among the stocks thus dealt with there is included the stock issued for the redemption of the gas annuities. This issue consists of £272,268 of 3 per cent. stock, redeemable in 1921. In accordance with the resolution of the Council, this amount, together with any other further issues of the same class, will be redeemed by the Corporation in 1921. The Corporation of Edinburgh are recommended to adopt a similar resolution next week. The step is taken with a view to keeping up the value of the stock. Were the period of redemption left indefinite, the market value would fall, to the prejudice of present holders of the stocks, and to the loss of credit of the Corporations.

On Saturday last, the annual inspection of the works for the supply of water to the town of Greenock was made by the Corporation, who were accompanied by Sir Hugh Shaw Stewart, the Lord of the Manor. After the inspection, dinner was served, and a toast list was gone through, in the course of which Provost Denholm mentioned that there was water in the reservoirs equal to 184 days' supply. It was also mentioned that the first public water supply for Greenock was designed by the immortal James Watt, and that the first pond he made was still in existence, above the Upper Greenock Railway Station.

As a result of the recent scare upon the existence of insects in the Edinburgh water supply, the Plans and Works Committee of the Edinburgh Town Council have this week resolved to recommend that all the existing ball form of fire-hydrants in the streets be replaced by those of sluice form, and that the work be done within the next six months. The cost will be about £9000.

The South Oxfordshire Water and Gas Company have placed a contract for the supply and fitting up of complete automatic installations, including meter, cooker, brackets, pendants, piping, &c., with the Richmond Gas Stove and Meter Company, Limited. It is expected that some 400 to 500 houses will be fitted up in this manner. The last-named Company are to hold an exhibition, and thoroughly develop the district for cookers, &c.

CURRENT SALES OF GAS PRODUCTS.

Week ending April 7.

London prices maintain their position, with little alteration one way or the other, during these slack months. Pitch is still much inquired for; and stuff sold is being taken quite up to time, and in some cases rather in advance of arrangements. Crude carbolic 60° is still from 1s. 9¾d. to 1s. 10d. net; and 90 per cent. benzol varies from 9½d. to 9¾d. net, according to position. There is considerable demand for pyridine; and an improvement in price may be looked for. Sulphate of ammonia stands at £12 10s. on Beckton terms, with very good demand for prompt; but stocks are low.

LIVERPOOL, *April 7.*

Sulphate of Ammonia.

There has been a quiet market throughout the week, and the tendency of prices has been rather in favour of buyers, the closing quotations being £12 5s. per ton f.o.b. Hull, £12 6s. 3d. per ton f.o.b. Liverpool, and £12 7s. 6d. per ton f.o.b. Leith. Although considerable orders for the Colonies have been placed within the week, the bulk of the buying has again been for covering contracts, shipments to Spain and the Continent being against old contracts. More seasonable weather has not yet brought out a revival of home demand, interrupted by severe weather in March, and so far there are no signs of fresh Spanish or Continental requirements. The forward position has been neglected, divergence of views between sellers and buyers practically precluding business.

Nitrate of Soda.

This article is firm in all positions, and although the agreement to renew the combination of producers for three years is not likely to affect the prompt and near positions, it is calculated to secure the stability of the market later. Spot prices are 11s. 4½d. per cwt. for 95 per cent., and to 11s. 7½d. for refined quality.

LONDON, *April 7.*

Tar Products.

The market has remained quiet during the past week. Pitch is steady; but there does not appear to have been much business done. Sales are reported on the east coast at 26s. 6d.; but the best Yorkshire makers would not accept less than 27s. It is again reported that 25s. has been paid on the west coast. In London, there is practically nothing doing, as dealers will not pay the prices indicated by makers. Consumers in South Wales are still disposed to buy a little for delivery over the second half of the year, and would probably be prepared to do business for the first half of 1907 if the opportunity presented itself. One or two small parcels have been offering in this district for prompt delivery, but the prices offered were too low to induce business; buyers argument being that they were already fully bought for

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early delivery, and that the pitch would have to be put into stock. There does not appear to have been much business doing on the Continent; the freight asked being so high, in consequence of coal shipments, that dealers have been compelled to raise prices without business resulting. Anthracene is still very quiet, and there does not appear to have been any business doing in same. In benzol, makers seem rather firmer in their ideas, and now ask 9¾d. for 90 per cent., while 50 to 90 per cent. is quoted at 10¼d. A large contract is reported to have been made in special quality gas-enriching benzol at about 1s.; but such sales do not affect the market for ordinary quality to any extent. Solvent still remains very firm, and it is difficult to fix actual prices. If prompt delivery of special quality was required at London, 1s. 1d. to 1s. 2d. would probably have to be paid. It is reported that 1s. was paid in Manchester for a fair quantity for April delivery, and probably this is about the market value. London creosote remains firm. More than one London maker reports having declined 1¾d. for a large quantity, though some 30,000 gallons were sold at this price to picklers here, and a small quantity of very inferior make is said to have been placed at 1⅝d. In Yorkshire, there does not appear to be much business doing, and prices may be taken as 1⅜d. to 1½d., according to position and delivery. One or two freights of country oil have been sold in London for immediate delivery at very low prices. In carbolic acid, the market continues firm, and there appears to be a good demand for crude. A parcel of 70's was sold at the equivalent of 2s. 1d. f.o.b. on the east coast; while for 60's makers ask 1s. 9¾d., and in some cases 1s. 10d. for both prompt and forward delivery. It would appear that some of the German consumers are now rather more anxious to buy crude than was the case a little while ago; and this also holds good for the English buyers. Crystals remain steady, and makers still ask 6d. for 39-40 per cent., and 5 15/16d. for 34-35 per cent. There does not appear to be any business doing in toluol, and the nominal value may be taken as 1s. 1d. per gallon. The demand for pure, which existed some little time ago from the Continent, now appears to have been satisfied, and there is no desire to purchase, except at reasonable prices.

Average values during the week were: Tar, 16s. 6d. to 21s. Pitch, London, 27s. 9d. to 28s.; east coast, 26s. 6d. to 27s.; west coast, 24s. 6d. to 25s. Benzol, 90 per cent., 9¼d. to 9¾d.; 50-90 per cent., 10¼d. to 10½d. Toluol, 1s. 0½d. to 1s. 1d. Crude naphtha, 4¼d.; solvent naphtha, 1s. to 1s. 1d.; heavy naphtha, 11d. to 1s. Creosote, London, 1⅜d.; North, 1⅜d. to 1 7/16d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9½d. to 1s. 10d. Naphthalene, £4 10s. to £8; salts, 20s. to 20s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market for this article has remained quiet during the whole of the week, and prices have not changed. Beckton still ask £12 12s. 6d., though it is reported that second-hand parcels have been offering at under this price. There is very little doing in Hull, and the price remains at about £12 5s. per ton. In Leith, the market keeps firm at about £12 10s.; but makers have very little to offer, appearing to be well sold. The market seems to be steady in Liverpool at £12 5s. to £12 7s. 6d.; but there is very little business to record. It does not appear likely that there will be much alteration in this article until after the Easter holidays.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The expected rise in the price of engine fuel took place last Tuesday. All classes of burgy, slack, and steam nuts were advanced 5d. per ton. The advance was general throughout the Lancashire districts. House coal remains in good demand, owing to the continued cold weather; but although prices keep firm, there is no actual change to report. Gas coal and cannel are going out steadily under last year's contracts. New contracts, however, are being entered into; coalowners holding out for slight advances. The Salford Corporation have accepted a contract from the Earl of Bradford for 15,000 tons of Great Lever cannel, to be delivered at their several gas-works during the ensuing twelve months; also 30,000 tons of screened Arley coal from Messrs. Jas. Roscoe and Sons. This will indicate the competition existing in the coal market. The average quotations on the Manchester Coal Exchange are as follows: Best house coal 13s. to 14s., secondary 12s. to 13s., common 9s. to 10s., engine fuel (burgy, slack, and steam nuts) 7s. 11d. to 8s. 9d., medium 6s. 6d. to 7s. 6d., common 5s. 6d. to 6s. 6d., and inferior slack 5s. at the pit mouth. Coal for shipping on the Manchester Canal is 9s. to 10s.

Northern Coal Trade.

The coal trade is now not so pressed with orders, but the approach of the holidays has caused a little additional demand; and the prices are still relatively very high. In the steam coal trade, there is a strong demand; and prices rose to from 11s. 6d. to 12s. per ton f.o.b. for best Northumbrian, second-class steams being about 10s. 6d., and steam smalls very firm at from 6s. 6d. to 7s. 6d. Gas coals have also been rather more freely sold for prompt shipment; and the prices in a few cases have been higher—the current quotations being from about 9s. 3d. to 10s. 3d. per ton f.o.b. for Durham gas coals, according to quality. The deliveries on the long contracts, however, are now lower than they were; but the output is still fairly taken up. As to the contracts in the market, it seems to be the belief that more have been placed at advances of from 9½d. to 10½d. per ton, according to the class of the gas coals; and there are also some smaller contracts for local companies under negotiation. But nothing of an official character is known as to these results. Coke is a little steadier; but in regard to gas coke, the limited output is now better taken up, without much change in the price. For good gas coke for export, 10s. 6d. to 11s. is quoted, though it is believed that contracts at higher prices are running.

Scotch Coal Trade.

The week was one of great activity, but with forebodings that there would soon be a return to more normal conditions. It is not expected

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Buffalo, N.Y.	2,000,000	Newcastle-on-Tyne	1,800,000
Windsor St. Works, Birmingham	2,000,000	Winnipeg, Man.	500,000	Leeds	1,800,000
Saltley Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Malton	150,000
Colchester	300,000	York	750,000	Smethwick	500,000
Birkenhead	2,250,000	Rochester	500,000	Gravesend	300,000
Swindon (New Swindon Gas Co.)	120,000	Kingston, Ont.	300,000	Pernambuco, Brazil	125,000
Saltley, Birmingham (Second Contract)	2,000,000	Crystal Palace District	2,000,000	Duluth, (Second Contract)	300,000
Windsor St., Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Leicester (Second Contract)	1,000,000
Halifax	1,000,000	Caterham	150,000	Newport (Second Conttract)	250,000
Toronto	250,000	Leicester	2,000,000	Brockville	250,000
Ottawa	250,000	Enschede, Holland	150,000	Toronto (Third Contract)	750,000
Lindsay (Remodelled)	125,000	Buenos Ayres (River Plate Co.)	700,000	Montreal, Ont. (Second Con.)	1,800,000
Montreal	500,000	Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
Toronto (2nd Cont., Remodelled)	2,000,000	Kingston-on-Thames	1,750,000	Hamilton, Ont.	400,000
Belleville	250,000	Accrington	500,000	Rochester (Third Contract)	1,600,000
Ottawa (Second Contract)	250,000	Tonbridge	300,000	Leeds (Second Contract)	900,000
Brantford (Remodelled)	200,000	Stretford	500,000	Buenos Ayres (Primitiva Co.)	1,200,000
St. Catherines (Remodelled)	250,000	Oldbury	300,000	Buenos Ayres (New Co.)	1,200,000
Kingston, Pa.	125,000	Todmorden	500,000	Christchurch, N.Z.	300,000
Peterborough, Ont.	250,000	Saltley, Birmingham (Third Contract)	2,000,000	Rochdale	1,600,000
Wilkesbarre, Pa.	750,000	York (Second Contract)	750,000	St. John's, Newfoundland	250,000
St. Catherines (Second Cont.)	250,000	Rochester (Second Contract)	500,000	Brantford (Second Contract)	400,000
		Newport (Mon.)	250,000	Smethwick (Second Contract)	500,000
		Tokio, Japan	1,000,000	Pontypridd	250,000
				Montreal (Third Contract)	1,800,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

that the market will be much further disturbed by the troubles in France or the United States. There is a feature in the situation which is of more importance than either of these temporary incidents, which is that trade generally in Holland and adjacent countries is reported to be very bad at present. Fortunately, industries at home are improving. The prices quoted are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 9d. to 10s., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 271,706 tons—an increase of 6146 tons upon the preceding week, and of 45,009 tons upon the same week of last year. For the year to date, the total shipments have amounted to 2,985,501 tons—an increase of 252,689 tons upon the corresponding period of 1905.

Gas-Coal Contracts.

The "Yorkshire Post" last Thursday contained the following announcement with reference to recent gas-coal contracts: The Commercial Gas Company, of London, through negotiations with the collieries, are now reported to have renewed all their expiring contracts at prices ruling from 8s. 7½d. to 9s. per ton—figures which are from 9d. to 1s. per ton above what was paid last year. The total quantity is about 200,000 tons. A contract for 34,000 tons of Wear prime gas coal is stated to have been secured by local merchants for Thornley, Wearmouth, or Londonderry coals, at a price which leaves a little over 10s. per ton f.o.b., ex tax. The supply of 12,000 tons of Thornley gas coal for the Bologna Gas-Works has also been secured by local merchants, at an f.o.b. price of 11s. 2d. per ton, including tax. Shipment is to be to Leghorn. Rotterdam advices say that the contract for the Zutphen Gas-Works has gone to Westphalia.

Reduced Price of Gas for Power at Longton.

Several large consumers of gas for power purposes having applied to the Gas Committee for a substantial reduction in price, the Gas Engineer and Manager (Mr. W. Langford) reported to them at some length on the subject. It appears that the Committee have been advised from time to time in regard to the use and development of suction gas for engines, where large units of power are needed, and have made concessions in price, so that at present gas for motive power purposes in Longton is sold at 7d. per 1000 cubic feet less than that used for lighting, &c. Mr. Langford, in his report, reminded the Committee that there are three important reasons why gas undertakings are favouring users of motive power: (1) Because it is a steady demand both winter and summer; (2) because it is principally a day load; and (3) because of the competition of suction gas. To small users of power—say, from 2 to 10 horse power—suction gas was not, he said, likely to compete with coal gas. But for the larger units, coal gas must come down, or it would have to make way for producer gas; for, though among several other disadvantages, the calorific value of suction gas was only one-fourth that of coal gas, yet the cost was so cheap that the time had come for the Committee to consider how much further they could reduce the price in order to retain present large consumers for power. As the result of the report, the Committee recommended the adoption of a new scale of charges, according to which the price varies with the quantity of gas consumed, and ranges from a reduction of 1½d. to 6d. per 1000 cubic feet; and the Town Council have sanctioned the new scale.

Proposed Taxation of Illuminants in Russia.—With the view of relieving Russia of some of her financial difficulties, it is proposed to levy new taxes; and in a report which the Finance Minister has drawn up for submission to the Duma, the imposition of taxes on electrical energy and gas for lighting purposes is stated to be "absolutely justifiable, and would yield possibly from two to three million roubles." A tax on candles is also projected.

Gas-Testing in South London.—At the meeting of the London County Council to-day, the Public Control Committee will report that the Council's gas-testing stations in Blackfriars Road and Hill Street, Peckham, in the district of the South Metropolitan Gas Company, which for a number of years have not been used owing to the refusal of the Company to connect these testing-places with their mains in accordance with the notification of the Gas Referees, have now been so connected and opened. The Committee have accordingly arranged for Mr. B. H. Gerrans and Mr. H. W. Teed, two of the Gas Examiners, to take up their duties at these stations.

Fatal Accident at the Croydon Gas-Works.—A verdict of "Accidental death" was returned by the Jury who sat to inquire into the circumstances attending the death of a man named Mainwaring, who recently got caught by a coke-conveyor at the Croydon Gas-Works. Deceased was in the employ of Messrs. W. J. Jenkins and Co., of Retford, and was at the time of the accident superintending a trial run of a coke-conveyor which the firm had just erected. Mr. W. J. Jenkins said that Mainwaring was a good, steady workman, and was used to the machinery; while Mr. J. W. Helps produced plans and photographs of the scene of the occurrence, and explained the working of the conveyor, which he said had not yet been taken over by the Gas Company.

Opposition to a Welsh Electric Lighting Scheme.—Strong opposition was offered at the Board of Trade inquiry recently held at the Cardiff Town Hall, by Mr. T. H. W. Pelham, into the application of the Gelligaer and Rhigos Rural District Council for a Provisional Order to enable them to light a compulsory area at Bargoed and Gilfach by electricity, to be supplied in bulk by the colliery companies in the vicinity, and for the erection of a generating station. Mr. Frank T. James (the Clerk) explained that the application would not have been made had it not been that the public had been badly treated by the local Gas Company in the matter of public lighting. The opponents included the Powell Duffryn Company, Messrs. Guest, Keen, and Nettlefold, the Rhymney Iron Company, the Rhymney Railway Company, and the Rhymney and Aber Valleys Gas and Water Company; and they maintained that the district could not be lit by electricity at a profit, because the great majority of the houses were occupied by working men, who generally used paraffin lamps for illuminating purposes.

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London Fire Statistics.

According to the recently issued annual report of the Fire Brigade Committee of the London County Council, the total number of fires (excluding those occurring in chimneys) reported last year was 3511, or 105 less than in 1904. Of the total, 407 are ascribed to gas lights and stoves. Considering the much greater extent to which gas is now used, that it is the poor man's illuminant, and that the poor are proverbially careless, the figures come out very well in comparison with the alleged "safe" electric light; for no fewer than 70 fires in the Metropolitan area were caused during last year by defective electric circuits, two other fires by articles coming in contact with electric conducting rails, and one by the overheating of an electric lamp.

Regulations Regarding Gas-Services at Coventry.

A resolution of the Coventry Gas Committee, that in future service-pipes from the street-mains be laid only to the boundary of private property at the expense of the Corporation, and that property owners be required to pay for the portion beyond that point, led to some discussion at the last meeting of the Town Council. Mr. Gardner wanted to know at what point the charge would commence, and whether, if private property owners had to pay the charges, they would have some choice in fixing the position of the meters, which were now placed most inconveniently. Alderman West thought the resolution was retrograde, because if they made builders pay for the service-pipes in small cottages, it would naturally be put upon the cottages. Mr. Errington thought it was a step in the right direction, as it should not be left to the Manager to arbitrate as to what customers should or should not pay. Mr. Batchelor said the Committee had decided to charge for all services other than slot meters, when they went past the boundary of private property.

Lancaster Gas Committee and Local Ironmongers.

In the "JOURNAL" last week (p. 53), reference was made to the decision come to by the Gas Committee of the Lancaster Corporation in regard to the letting out of gas-fires or radiators on hire. When the minutes of the Committee came before the Town Council, Alderman Helme, M.P., the Chairman of the Committee, explained that their resolution was arrived at after very careful consideration of the petition from the Ironmongers' and Plumbers' Association asking that the Committee should not continue to extend their business in gas fires, radiators, and so on. The Committee regarded the matter very sympathetically. They did not let out gas fires or radiators on hire, but they did a small trade in selling gas fires and cookers. They hired out the latter, and sometimes people wished to buy them. But the total sales of gas-cookers for the half year only amounted to £19 13s. 10d., gas-fires to £7 1s. 6d., material to £24 0s. 1d , labour to £7 12s. 9d.—an aggregate of £58 8s. 2d. If the Committee remained in this position, the trade would see that their interests were not being treated unfairly. It was simply a matter of convenience; and their attention having been called to it, the Committee were considering how they could dispose of some of the stock, and gradually recede from the business, with a view to meeting the wishes of the private traders.

Gas Companies and Ironmongers in Co-Operation.—The exhibitions of gas appliances held in May last by the ironmongers of Hornsey, acting in co-operation with the local Gas Company, proved so successful, that the "Ironmonger" says it has been decided to repeat the experiment. Accordingly three displays of fittings, fires, &c., have been arranged in different parts of the district during the fortnight from the 23rd inst. to the 5th prox. The arrangement provides for the Gas Company lending as show-room samples as many gas-cookers, gas-fires, &c., as the ironmongers care to undertake to stage. At the exhibitions, the ironmongers take orders from the samples on view, and pass them on to the Company, who supply and, if necessary, fix the appliances, collect the money due, and credit the ironmonger with 10 per cent. on the price received. The agencies are terminable by a month's notice on either side.

Electric Lighting Offer Declined.—The Kensington and Knightsbridge Electric Lighting Company recently submitted a scheme for extending the use of electricity for the lighting of the streets of the borough by means of "Excello" yellow-flame arc lamps. They proposed to substitute for 168 incandescent gas-lamps in nine streets (the annual cost of which is £555), 36 arc lamps, and to supply current for same at 1d. per unit on a five years' agreement, subject to the Council paying the cost of the installation. In the alternative, the Company offered to pay the cost of installation and charge at the rate of 1½d. per unit. According to the Company's estimate, the Council would save £100 a year by the change and would have a considerably greater candle power. A Committee who went into the matter fully, reported that the area proposed to be dealt with was at present well lighted; and they recommended that the offer be declined. This was agreed to.

Sale of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards offered for sale, by order of Directors, two new issues of gas and water stocks and shares. The first lots consisted of £5300 of 4 per cent. irredeemable debenture stock of the South-West Suburban Water Company, which was placed at from £110 to £110 5s. per £100 of stock; and the next, some 4¼ per cent. stock of a similar character, which was sold at from £114 to £116 10s. per £100. Under instructions from private owners, Mr. Richards also sold some fully-paid £10 original shares in the same Company, the last dividend on which was at the rate of 5½ per cent. per annum, at £14 10s. each; and some fully-paid 5 per cent. preference shares, of like nominal value, at £12 10s. apiece. A small parcel of £10 shares in the Ascot District Gas Company (last dividend 5½ per cent. per annum) fetched from £10 10s. to £10 12s. 6d. per share, *cum div.* as from the 1st of January last.

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AGENTS FOR SCOTLAND:

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Belfast Gas Undertaking.—According to Mr. J. A. Doran, the Chairman of the Belfast Gas Committee, though it would at present be premature to attempt anything like an estimate of the results of the working for the year which ended on the 31st ult., there is every reason to anticipate that they will be satisfactory. The output of gas shows an increase over the previous twelve months of 5½ per cent. The new meters sent out last year were as follows: Ordinary meters, 3362; slot meters, 6104—total, 9466. The installation of high-pressure gas lamps for the lighting of the thoroughfares round the new City Hall was brought into action on the 30th ult.; and it seems to have given general satisfaction.

Reading Town Councillors and the Sulphur Question.—Those members of the Reading Town Council who are opposing, with so much persistence, the Gas Companies (Removal of Sulphur Restrictions) Bill will not derive much satisfaction from the reply received by the Town Clerk from Mr. Rufus Isaacs, K.C. (the Borough Member), to the request of the Council that he should oppose the Bill in Parliament. Mr. Isaacs pointed out that, as the Corporation have not presented a petition against the Bill, any opposition by him on their behalf would be of no value; and that as a majority of the whole number of the members of the Council had not voted in support of the motion to oppose it, any reference by him to the Council's request would be met with a statement that the requisite majority was not forthcoming to support the proposal to petition the House of Commons against the measure.

Bursting of a Water-Main at Sutton Coldfield.—Early last Thursday morning, some alarm was caused at Sutton Coldfield by the bursting of a large main of the South Staffordshire Water-Works Company, close to the approach to the London and North-Western Railway Station. The first sign of anything wrong was the sight of moving flagstones, several of which were lifted bodily from the footpath. The water, which thus found an outlet, rushed with great force down High Street, and into the sewers. The main broke immediately over the tunnel of the London and North-Western Railway, and for some time it was feared that the crown would give way; but fortunately this did not happen. Later on, some 15 or 20 feet of the pavement fell with a crash on the arch of the tunnel, owing to the woodwork which supported the soil having given way; and a considerable portion of the roadway also collapsed. A gang of men were quickly at work; and the water was turned off.

West Gloucestershire Water Company.—For some time past the Directors of the West Gloucestershire Water Company have borne in mind the desirability of obtaining an additional supply as a precautionary measure to counteract the effect of seasons of exceptional drought and to meet increased business; and accordingly a fresh source has been acquired at Cowhorn Hill, Oldland, in the heart of the Company's district, and will, it is expected, be available within the next six months. Contracts have been placed for pumping-engines in duplicate, for filters, and for the erection of the necessary buildings, at a total estimated cost of about £8000. In order to meet this, and to make provision for expenditure already incurred and to be incurred, an extraordinary general meeting was held after the recent half-yearly meeting, at which resolutions were passed sanctioning the raising of the remainder of the ordinary shares authorized under the West Gloucestershire Water Act, 1902, and the creation, issue, and disposal of the debenture stock authorized under the Acts of 1887 and 1899. A dividend was declared at the rate of 4 per cent. per annum (less income-tax) for the past six months on the 10 per cent. maximum shares and £2 16s. upon the 7 per cent. maximum shares.

Water Supply to Workhouses.—At the meeting of the Executive Council of the Association of Poor-Law Unions held last week, the Parliamentary Committee reported that they had had before them the following letter from the Pontefract Board of Guardians: "The Pontefract Corporation are promoting a Bill which includes a provision that a supply of water for domestic purposes shall not be deemed to include a supply for any workhouse or other large building. This means that such supply shall be paid for by meter or by agreement. It has been decided (*Liskeard Union v Liskeard Water-Works Company*) that a workhouse is entitled to a supply of water for domestic purposes by paying a rate on the basis of annual value, as in the case of other dwelling-places. The Guardians of the Union have decided to oppose the Bill in so far as it affects their interests; and I am to ask the Poor-Law Unions Association to assist them in the matter, which, of course, is of general interest to other unions, inasmuch as, if this provision becomes law, other authorities may seek similar powers, to the prejudice of other boards of guardians." The Committee found, after due inquiry, that in a number of cases the supply of water to workhouses was paid for by meter or by agreement; and they therefore did not see their way to recommend the Council to take any action in the matter. The Council agreed with this conclusion.

Consolidated Water-Works Company of Rosario, Limited.—The report of the Directors of this Company for the past year, which was presented at the ordinary general meeting last Friday, set forth that the gross revenue, after making provision for bad and doubtful debts, amounted to £54,753, and the working expenses to £22,744; leaving a balance of £32,009. After deducting debenture stock interest and other charges, and the interim dividend on the preference shares, and placing £3041 to the reserve fund (for the redemption of capital), there remained an available balance of £15,763. The Directors recommended a dividend of 6 per cent. on the ordinary shares (free of tax), leaving a balance to be carried forward to the ordinary share dividend account of £5290; making a total at the credit of this account of £11,638. The lawsuit commenced by the Municipality of Rosario with the object of declaring the Company's supplementary concession null and void, referred to in the last report, was decided in the Court of First Instance in October last in favour of the Company. An appeal against this judgment, however, has been lodged by the Municipality, and is now before the Higher Court. The increase in the Company's business will necessitate the early provision of considerable additions to its installation; and the Directors have now under consideration the question of adding a new pumping main, which may entail an expenditure of £25,000. The report was adopted.

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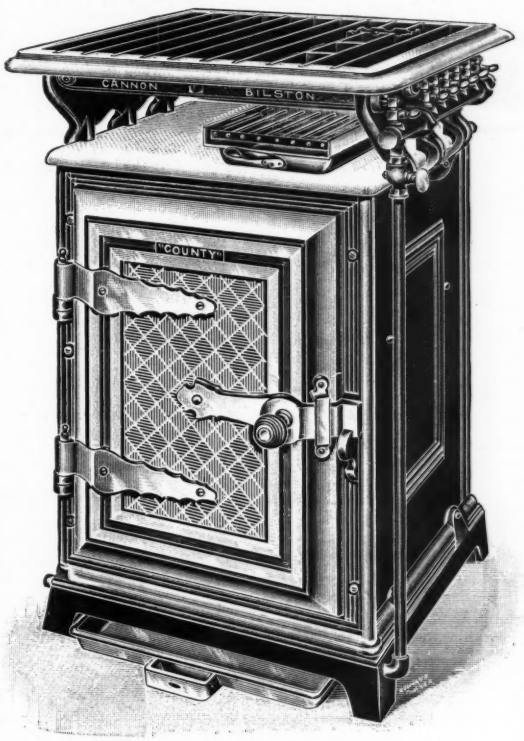
FOR HIRING-OUT PURPOSES.



SURPRISING VALUE
AND POPULARITY.

Combines all the
Modern Improvements.

Should be placed on the Hire List
of all Gas Companies.

Ask for our Illustrated List, free on application.

MANUFACTURERS:
CANNON IRON FOUNDRIES, Ld.,
DEEPFIELDS, Nr. BILSTON, STAFFS.

London Office and Show-Rooms:
Bath House, 57-60, Holborn Viaduct, E.C.

The Mirfield Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for converting one of their telescopic gasholders into a three-lift holder.

The Directors of the Primitiva Gas and Electric Lighting Company of Buenos Ayres, Limited, recommend the payment of 7 per cent. per annum on the ordinary shares for the past year.

Arbitration proceedings in connection with the proposed purchase by the Manchester Corporation from the Earl of Wilton of land adjoining Heaton Park, required for the construction of a water storage reservoir, commence to-day at the Surveyors' Institution.

The Pulsometer Engineering Company, Limited, of Reading, have on order, in addition to many other plants for various trades, 3000 gallons per hour "Criton" water-softeners for the East Greenwich works of the South Metropolitan Gas Company and for the Ipswich Gas Company.

The Directors of the Newcastle and Gateshead Gas Company last Tuesday allotted the new issue of £40,000 of 4 per cent. preference stock, tenders for which were invited in our advertisement columns. The total amount applied for reached over £200,000; and the average price realized for the stock allotted was £101 6s. 11d. per cent.

At the recent annual meeting, held in Glasgow, of Stewarts and Lloyds, Limited, the Chairman (Mr. J. G. Stewart), in moving the adoption of the annual report, said the amount placed to depreciation was £40,000; being the same as last year. The amount placed to reserve was £25,000, the same as last year; and the balance carried forward was £54,750, compared with £53,100 last year. The works had been fully employed. The report was adopted, and the usual dividends on the ordinary and preference stocks were declared.

Under the title of "Block Light, Limited," a Company has been formed with a capital of £110,000, in £1 shares (50,000 being 7 per cent. cumulative preference), to carry on the business of lighting and heating engineers, &c. There will be no initial public issue.

A meeting of the South Staffordshire Gas-Strip Association was held at Birmingham last Thursday in connection with the ironmasters' quarterly meeting; and, after an animated discussion, it was decided to reduce prices 10s. a ton. The new basis price becomes £7 to £7 2s. 6d. Hoops and thin strip also fell 10s. to £7 10s. Even at these prices, it is stated, there was underselling.

"Coal Gas and How to Burn It" was the title of a popular lecture delivered by Professor Lewes to the gas consumers of Cardiff last Wednesday evening, under the auspices of the Cardiff Gas Company —Mr. C. H. Williams, the Chairman, presiding. The lecturer pointed out that since the general adoption of incandescent mantles in 1896, the tendency had been to reduce the illuminating power and lower the price of gas as far as possible. This session the Cardiff Gas Company had applied to Parliament for an Act authorizing them to reduce the candle power of their gas; and thus they would be able to use local instead of North of England coal, and make considerable concessions in the price of gas. He urged the discarding of flat-flame burners in favour of incandescent mantles, which he said gave ten times the light for the same consumption of gas. He impressed upon his audience that the efficiency of the light obtained and the healthfulness of coal gas as an illuminant depended upon the consumers; and he strongly advised them all to consult the officials of the Company with regard to the best burners to be employed, and to thoroughly overhaul those now in use. He said that if this were done, Cardiff would be far better lighted in the future than it had ever been before.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.
GAS ENGINEER AND MANAGER. Bingley Gas Department. Applications by April 18.
GAS MANAGER. Ashford (Kent) Gas Department Applications by April 19.
GAS MANAGER. Tavistock Lighting, Coal, and Coke Company. Applications by April 21.
LONDON REPRESENTATIVE OF ENGINEERING FIRM. No. 4583.
WORKS MANAGER FOR FOUNDRY, &c. Drakes, Limited, Halifax.
GAS STOVE AND METER REPRESENTATIVE. No. 4581.
SUPERINTENDENT OF FITTERS AND OUTDOOR WORK. No. 4582.
GENERAL FOREMAN. Scarborough Gas Company.
CHARGE OF STOVE REPAIRING SHOP. No. 4580.

Firm Wanted to Represent High Power Lamp.
ALEXANDER, BURSLEM.

Plant (Second-Hand) for Sale.
ENGINE AND BOILER, RETORT MOUTHPIECES, &c. Enfield Gas Company.
GASHOLDER AND SCRUBBER. Matlock Gas Company.
RETORT HOUSE IRONWORK and FITTINGS, VALVES, &c. Newport (Mon.) Gas Company.

Engineering Business for Disposal.
LIQUIDATOR. Graham, Morton, Limited.

Company Meeting.
IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel, May 1. 2.30 o'clock.

Stocks and Shares.
PINNER GAS COMPANY. April 14.

TENDERS FOR

Benzol.
DARWEN GAS DEPARTMENT. Tenders by April 28.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Carburettor.
BROADSTAIRS GAS COMPANY. Tenders by April 30.

Coal and Cannel.
LYMM GAS DEPARTMENT. Tenders by April 18.
NEWBURY GAS DEPARTMENT. Tenders by April 17.
WALLASEY GAS DEPARTMENT. Tenders by April 24.

Fire-Clay Goods.
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.

Gasholder Resheeting and Repairing]Purifier Covers.
HEREFORD ASYLUM. Tenders by April 21.

General Stores, Shovels, Forks, Oils, Paints, &c.
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Iron and Steel.
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Lamps.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Light Oil.
BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by April 23.

Meters (Gas and Water).
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.

Pipes (Brass, Copper, and Lead).
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Pipes (Wrought and Cast Iron).
DARWEN GAS DEPARTMENT. Tenders by April 28.
LEEDS GAS DEPARTMENT. Tenders by April 23.
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Purifiers, &c.
TIVERTON GAS DEPARTMENT. Tenders by April 25.

Retort Castings.
LEEDS GAS DEPARTMENT. Tenders by April 23.

Sulphuric Acid.
BURY GAS DEPARTMENT. Tenders by April 16.
COLNE GAS DEPARTMENT. Tenders by April 21.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Tar and Liquor.
COLNE GAS DEPARTMENT. Tenders by April 21.
DARWEN GAS DEPARTMENT. Tenders by April 28.
WIGAN GAS DEPARTMENT. Tenders by April 16.

Valves, Cocks, and Hydrants.
WALLASEY GAS AND WATER DEPARTMENT. Tenders by April 24.

Washer Scrubber.
TIVERTON GAS DEPARTMENT. Tenders by April 25.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EASTER HOLIDAYS.

In consequence of the EASTER HOLIDAY, all Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office

NOT LATER than the FIRST POST ON SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd., HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.)
86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone 341, AVENUE.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

BROTHERTON & CO., LIMITED. Offices: Commercial Buildings, Leeds. Correspondence invited.

THE KEITH LIGHT.

OVER 3000 INSTALLATIONS IN DAILY USE. **SEE illustrated advertisement in next** week's issue.

James Keith and Blackman Co., Ltd., 27, Farringdon Avenue, London, E.C.

AMMONIACAL Liquor wanted. Brotherton and Co., Ltd., Ammonia Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, and Wakefield.

"NUGEPE" GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO., LOWER MOSS LANE, MANCHESTER, S.W.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GAS TAR wanted. Brotherton and Co., Ltd., Tar Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, and Wakefield.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.** Illustrated sheets on application.

JOHN WALSH WALSH,
Soho and Vesta Glass Works, BIRMINGHAM.
Telegrams: "Vesta, Birmingham."
National Telephone: No. 63.
London Show-Room: 4, Holborn Circus, E.C.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. Brotherton and Co., Ltd., Chemical Manufacturers. Works: Birmingham, Leeds, and Wakefield.

GASHOLDER PAINTING.

PAINTING Work for all kinds of Gas- Works Plant, Roofs, Bridges, &c., undertaken by Contract or otherwise. Frederick Boyall, 31, Regent's Row, Dalston, N.E.

TEMPERLEY TRANSPORTERS

FOR Rapid and Economical Handling of Coal and Coke in Gas-Works.

Next Illustrated Advertisement will appear on April 24.

TEMPERLEY TRANSPORTER COMPANY,
72, Bishopsgate Street Within, London, E.C.
Telephone: 365 London Wall. Telegrams: "Transumo."

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: Saturators, Bolton. Telephone 0848.

TO WATER AND GAS COMPANIES REQUIRING CAPITAL.

THE Water and Gas Debenture Share Investment Trust, Limited, of 37, High Street, Tunbridge Wells, are prepared to Invest £10,000 Capital in above, and also to Underwrite Progressive Water and Gas Companies' issues.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
Read Holliday and Sons, Ltd., Huddersfield.

GAZINE—A radical Solvent and Pre- ventative of Naphthalene deposits, which has been used for many years on the Continent for the cleaning of Mains and Services, and is now being adopted in England. It is also used for the Enrichment of Gas, and has an Illuminating Value of double that of 90 per cent. Benzol.
Supplied by C. Bourne, 120, Manor House Road, Newcastle-on-Tyne.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

TAR AND LIQUOR WANTED. Best Prices paid.
Dent and Co.,
Ouse Chemical Works, Selby.

APPLICANTS for the position of Assis- TANT-MANAGER in a Gas-Works in the South-West of England, advertised under No. 4575, are THANKED, and informed that a selection HAS BEEN MADE.

WANTED, a Works Manager for Foundry, Mechanics, Pattern, Boiler, and Smith's Shop (about 180 men employed). Must be a Practical Man with good Experience.
Apply, stating Age, References, and Salary required, to Drakes Limited, Halifax.

GAS STOVE AND METER REPRESENTATIVE.

WANTED—A smart, active gentle- manly Man. Age 25 to 30, to act as Junior Representative. Salary, Commission, and Expenses. Good prospects.
Apply, by letter, to No. 4581, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Man in a Provincial Gas Company, capable of TAKING CHARGE of Fitters and Superintending the Outdoor Work. Competent to advise and direct the Fitting up of Houses with the latest methods of Gas Lighting.
Wages commencing £2 per week.
Address, giving Experience, to No. 4582, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, by a large Suburban Gas Company, a thoroughly competent man to TAKE CHARGE of large Stove Repairing Shops. Must be a man who has had practical Experience in Tin and Brass Work, &c. Age not to exceed 40.
Apply, giving Particulars of Experience, *copies* of Testimonials, and Salary required, to No. 4580, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FIRM of good standing wanted to act as SOLE REPRESENTATIVES in this country for the Sale of New HIGH-POWER GAS LAMP (1200-Candle power). Moderate Cost, New Principle, very Economical Working (1½d. per hour), and most suitable for Street Lighting, Workshops, Railway Stations, Show Windows, &c.
For Particulars, write to F. G. Alexander, M.I.M.E., 21, Stoneley Street, Burslem, Staffordshire.

THE Bingley Urban District Council invite APPLICATIONS for the post of GAS ENGINEER and MANAGER. Salary, £200 per Annum.
Written applications, endorsed "Gas Manager," with *copies* of Two recent Testimonials, stating Age, Qualification, and Experience, to reach the undersigned not later than the 18th of April.
Alfred Platts,
Clerk to the Council.
Town Hall, Bingley.

URBAN DISTRICT OF ASHFORD (KENT).

THE Urban District Council of Ashford (Kent) invite APPLICATIONS for the position of GAS-WORKS MANAGER. Candidates must have had Practical Experience as Manager or Assistant Manager of a medium sized Gas-Works. Any Candidate canvassing members of the Council will be disqualified.
Applications, endorsed on envelope "Gas Committee," with *copies* of not more than Three recent Testimonials (which will not be returned), and stating Age, Experience, and Salary required, to be addressed to and reach me not later than the 19th of April, 1906.
John Creery,
Clerk.
11, Bank Street,
Ashford, Kent.

SCARBOROUGH GAS COMPANY.

GENERAL FOREMAN.

WANTED, a good all-round experienced MAN, with Mechanical Training. Must understand Sulphate Making and have a knowledge of the Manufacture of Carburetted Water Gas, and Working and Adjusting of Regenerative Furnaces. Salary, £2 10s. per week, with good House, Garden, Coal, and Gas.
Applications, stating Age and Experience, to be endorsed "General Foreman," and addressed to the Chairman of the Company.
Alexander Allan,
Engineer and Secretary.
Gas Offices, 32, Westborough,
Scarborough, April 4, 1906.

THE Tavistock Lighting, Coal, and Coke Company, Limited, invite APPLICATIONS for the position of GAS MANAGER. Annual make, 18 Millions. Salary, £100 per annum, with House, Coal, and Gas. Must thoroughly understand the Manufacture (especially Regenerator Settings) and Distribution of Gas.
Applications, stating Age, and Experience, with *copies* of Three recent Testimonials, to be sent by letter only, addressed to Mr. H. T. Doble, Chairman of Directors, Gas-Works, Tavistock, South Devon, not later than the 21st of April, 1906.
Any further Particulars may be obtained from
A. Francis,
Secretary.
April 4, 1906.

WANTED, Copper Scrap, 72s.; Brass, 48s.; Zinc, 16s.; Lead Ashes, 8s. Also old Wet Gas-Meters bought.
Rosse Works, Leeds Road, Bradford.

LONDON Representative—Wanted, a Gentleman with Good Connection among leading Consulting Engineers, Foreign Merchants, and Buyers to REPRESENT a First-Class Firm of Gas and General Constructional Engineers who are on Admiralty and other Government Lists. One with Practical Knowledge, able to Advise Clients and discuss Technical points preferred. Applications will be treated with strict confidence, and should state Age and Salary required.
Apply, by letter, in first instance, to No. 4583, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-MAIN Pipes, Clean and Perfect, Second-Hand 10-inch, 8-inch, 6-inch, 5-inch. Large Stock, drawn from Sockets, no broken ends, from £3 10s. to £4 10s. delivered, according to distance.
Firth Blakeley and Co., Thornhill, Dewsbury.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

MATLOCK AND DISTRICT GAS COMPANY.

TELESCOPIC Gasholder for Sale, 43 ft. 6 in. and 45 ft. diameter, each Lift 10 ft. deep and spiral-guided.
Also SCRUBBER, 3 ft. 6 in. diameter, 23 ft. 6 in. high, in Five Cylinders.
The Holder and Scrubber may be seen in use at the Gas-Works, Matlock.
Offers to the Secretary, Robert Hall, Esq., Gas Offices, Dale Road, Matlock.
Thomas Brown,
Gas-Works, Matlock, Manager.
March 27, 1906.

DISUSED Plant For Sale.—Offers are invited for the following, which may be seen at the Enfield Gas Company's Works, Ponders End Station, G.E.R., viz.:—
One 6-Horse Power Winding Engine, Friction Clutch, and Reverse Action.
Two 8-Horse Power Cornish Steam Boilers.
Sixty Retort Mouthpieces, 14 in. by 20 in., "⊓'s," with Morton's Lids.
Eighteen ditto, 15 in. by 21 in., oval, with Luted Lids.
Address, C. W. Offord, General Manager, Enfield Gas Company, Sydney Road, Enfield.

NEWPORT (MON.) GAS COMPANY.

GAS Plant for Sale.
First Section.
106 feet of Cast-Iron HYDRAULIC MAIN, 18 in. by 20 in., ∪-Shape. Four end Covers.
24 Cast-Iron CRUTCHES.
6 Bryan Donkin Rack and Pinion GAS-VALVES, 8-inch.
120 FURNACE BARS.
36 BEARING BARS.
12 DEAD PLATES.
36 SIGHT-HOLE BOXES, 5 in. by 5 in.
36 " " 8 in. by 6 in.
12 FURNACE DOORS and FRAMES.
84 MOUTHPIECES (⊓'s), 20 in. by 16 in.
84 ARCH PIPES, 6-inch diameter.
84 DIP PIPES, 6-inch diameter.
8 Cast-Iron END BUCKSTAVES.
7 CROSS GIRDERS, Cast-Iron.
11 BUCKSTAVES, Channel Steel.
2 Cast-Iron BUCKSTAVES.
22 Cast-Iron BRACKETS for Buckstaves.
84 ASCENSION PIPES, 6-inch diameter.
24 ASCENSION BENDS, 6-inch diameter.
12 Cast-Iron SHOES for Buckstaves.
168 Steel RETORT-LIDS.
The above may be viewed at the Crinday Works of the Company.
Further Information may be obtained from the Engineer.
Tenders to be addressed to the Chairman of the Company,
By order,
T. H. Hazell,
Secretary.
Gas Offices, Newport (Mon.),
April 5, 1906.

HEREFORD COUNTY AND CITY ASYLUM.

THE Committee of Visitors of the above-named Asylum invite TENDERS for RE-SHEETING GASHOLDER and REPAIRS to COVERS of PURIFIERS.
Specifications and other Information can be obtained on application to the undersigned, to whom Tenders must be posted so as to reach the Asylum not later than Saturday, April 21, 1906.
The Committee do not bind themselves to accept the lowest or any Tender.
H. E. Morgan,
Clerk to the Visitors.
The Asylum, Burghill,
near Hereford, April 4, 1906.

BOROUGH OF DARWEN.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of the following GOODS for One Year.
BENZOL.
WROUGHT-IRON TUBES AND FITTINGS.
CAST-IRON MAINS AND SPECIALS.
Full Particulars and Forms of Tender may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.
Sealed and endorsed Tenders must be delivered to me the undersigned not later than Saturday, the 28th day of April, 1906.
The lowest or any Tender not necessarily accepted.
By order,
William P. Halliwell,
Town Clerk.
Town Clerk's Office,
Darwen, April 4, 1906.

BOROUGH OF DARWEN.

TENDERS FOR TAR.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for all the surplus TAR produced at their Gas-Works for One Year.

Further Particulars and Forms of Tender may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed Tenders, endorsed "Tenders for Tar," must be delivered to me the undersigned not later than Saturday, the 28th day of April, 1906.

The highest or any Tender not necessarily accepted.

By order,
WILLIAM P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
Darwen, April 4, 1906.

THE Corporation of Bury are prepared to receive TENDERS for the supply of about 400 Tons of SULPHURIC ACID for the Manufacture of Sulphate of Ammonia, for a period of One Year from the 1st of May, 1906.

Forms of Tender and Conditions may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders, endorsed "Tender for Acid," to be sent to the Town Clerk, Bury, not later than Monday, April 16, 1906.

BROADSTAIRS GAS COMPANY.

THE Directors of the Broadstairs Gas Company are prepared to receive TENDERS for the supply of a CARBURETTOR.

Full Particulars may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Carburettor," to be sent in on or before April 30, 1906, addressed to the Chairman of the Company, Gas Office, Broadstairs.

The Directors do not bind themselves to accept the lowest or any Tender.

F. HIGGINSON,
Engineer and Secretary.

Gas Office, Broadstairs,
April 6, 1906.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for the supply of CAST-IRON PIPES, RETORT CASTINGS, &c.

Samples may be seen on application at our Stores Department, No. 21, Dewsbury Road, and Forms of Tender and Specification may be obtained on application to the undersigned.

Endorsed Tenders to be delivered not later than Monday, the 23rd inst., addressed to the Town Clerk, Town Hall, Leeds.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, East Parade,
Leeds, April 7, 1906.

WALLASEY URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

TO COLLIERY PROPRIETORS AND OTHERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the supply of about 3000 Tons of ROUND CANNEL, and about 32,000 Tons of screened GAS COAL, delivered in accordance with the Terms of the Specification, prepared by, and obtainable at the Office, of the Engineer, Mr. J. H. Crowther, Dock Road, Seacombe.

Sealed Tenders, addressed to the undersigned, and endorsed "Tender for Coal, Gas and Water Department," to be delivered (per post) at my Office as below, not later than the morning of Tuesday, the 24th of April, 1906.

The Contractor or Contractors will be required to enter into a bond, with approved sureties, for the due performance of his or their Contract.

The Council do not bind themselves to accept the lowest or any Offer.

By order,
H. W. COOK,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, March 28, 1906.

WALLASEY URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

CONTRACTS FOR STORES.

THE Wallasey Urban District Council are prepared to receive TENDERS to supply, for a period of Twelve Months, from the 30th of June next, the following, amongst other Articles; being the principal STORES required for use at their Gas and Water Works, viz.:

Wrought-Iron Tube.	Valves and Hydrants.
Stop Cocks and Main Taps.	Oils, Paints, Brushes, and Wash Leathers.
Lead Pipe, &c.	Gas and Water Meters.
Wrought-Iron Bars and Steel Plates.	Retorts and Fire-Bricks.
Cast-Iron Main Pipes.	Block and Sheet Tin, &c., &c.

Further Particulars, with Form of Tender, may be had, and Samples inspected, on application at the Gas and Water Engineer's Office, Dock Road, Seacombe.

Sealed Tenders, which must be on the printed Form, endorsed "Tenders for Gas and Water Stores," to be addressed to me, and delivered (per post) at my Office as below, not later than the morning of Tuesday, the 24th of April, 1906.

The Contractors will be required to enter into a bond, with approved sureties, for the due performance of their respective Contracts.

The Council do not bind themselves to accept the lowest or any Offer.

By order,
H. W. COOK,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, March 28, 1906.

BRIDGEWATER COLLIERIES COKE-WORKS.

(THE EARL OF ELLESMERE.)

TENDERS are invited for the Light OIL produced at the above Works for a period of Six or Twelve Months from the 1st of May, 1906, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding on the Little Hulton Mineral branch of the London and North-Western Railway.

Tenders, endorsed "Tender for Light Oil," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Office, 4, Chapel Walks, Manchester, on or before the 23rd of April, 1906.

Manchester, March 23, 1906.

BOROUGH OF NEWBURY.

(GAS DEPARTMENT.)

THE Gas Committee of the Newbury Corporation invite TENDERS for the supply of 5500 Tons of best GAS COAL or NUTS during the period of Twelve Months between July 1 next and the 30th of June, 1907, to be delivered free to Newbury Station on the Great Western Railway, in such quantities as may be agreed.

Tenders to be endorsed "Tenders for Coal," and addressed to the Chairman of the Gas Committee Gas-Works, Newbury, and delivered not later than the 17th of April next.

The Committee do not bind themselves to accept the lowest or any Tender.

Particulars and Form of Tender from the undersigned.

WM. RD. DAVEY,
Manager.

Gas-Works, Newbury,
April 7, 1906.

BOROUGH OF TIVERTON.

THE Gas Committee invite Tenders for supplying and erecting the following new Plant on their Foundations:—Four 15 feet square by 5 feet deep PURIFIERS, with Luteless Covers and Lifting Apparatus, Pickering Valves, and 12-inch Connections complete. Also a Holmes' 400 cubic feet per day WASHER-SCRUBBER, with Bye-Pass Valves and 12-inch Connections, exclusive of Engine.

For further Particulars, apply to the Manager, Gas-Works, Tiverton.

Sealed Tenders, to be delivered not later than Wednesday, the 25th inst., addressed to the undersigned, and endorsed "Gas Apparatus."

The Committee do not bind themselves to accept the lowest or any Tender, and reserve the right to divide the Contract.

C. M. HOLE,
Town Clerk.

Town Hall, Tiverton,
April 5, 1906.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the supply of CANNEL and best screened GAS COAL, to be delivered at their Gas-Works in Lymm, for a term of Twelve Months from the 1st day of July, 1906.

The probable quantities required will be about 100 Tons of Cannel and about 1800 Tons of Gas Coal, which must be freshly wrought, well screened, and free from Sulphurous Pyrites and other objectionable matter; but the Council reserve the right of increasing or decreasing the quantities named.

The person whose Tender is accepted will be required to enter into an agreement with the Council for the due performance of his Contract.

Sealed Tenders, stating price per ton delivered by Boat alongside the Works, to be sent to the undersigned on or before the 18th day of April, 1906, and endorsed "Coal Tender."

The Council do not bind themselves to accept the lowest or any Tender.

Forms of Tender are not supplied.

Further Particulars may be had on application to the Gas Manager, Mr. W. L. Donaldson.

W. MULLARD,
Clerk.

Council Offices, Lymm,
Cheshire, March 30, 1906.

COUNTY BOROUGH OF WIGAN.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of STORES over the Year ending on March 31, 1907, as follows:

(*a*) Wrought-Iron Tube and Fittings.
(*b*) Brass and Copper Tube and Fittings.
(*c*) Lead Gas-Pipe.
(*d*) Street Lamps.
(*e*) Merchant Iron.
(*f*) Weed Brooms.
(*g*) Shovels and Coke Forks.
(*h*) Wood Troughing and Covering.
(*m*) Galvanized Stove Pipe and Connections.
(*n*) Cast Mains and Connections.
(*o*) Screw and Retort Bolts.
(*p*) Galvanized Buckets.
(*q*) Sulphuric Acid.
(*r*) Surplus Tar.
(*s*) Benzol 90 per cent.

Forms of Tender may be obtained from the undersigned.

The Committee do not bind themselves to the acceptance of any Tender.

Tenders, sealed and endorsed with the name of the Article tendered for, to be delivered to Harold Jevons, Esq., Town Clerk, Town Hall, on or before Monday, the 16th of April next ensuing.

A sample of each Article to be forwarded, addressed to the Gas Engineer.

JOS. TIMMINS, M.Inst.C.E.,
Engineer, &c.

Borough Gas-Works,
March 28, 1906.

BOROUGH OF COLNE.

(GAS DEPARTMENT.)

TAR AND SULPHURIC ACID.

THE Gas Committee invite Tenders for the purchase of the surplus TAR made at their Works during the Twelve Months ending March 31, 1907; also for the supply of SULPHURIC ACID used in the Manufacture of Sulphate of Ammonia during the same period.

Particulars may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tar," or "Acid," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knotts Lane, Colne (Lancs.), and delivered not later than Saturday, April 21, 1906.

FRED THORPE,
Engineer and Manager.

Gas-Works, Knotts Lane,
Colne (Lancashire),
March 30, 1906.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 1st day of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December, 1905, and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the REGISTER OF TRANSFERS OF CAPITAL STOCK WILL BE CLOSED from the 17th inst. to the 1st prox., both days inclusive.

Notice is Hereby Further Given, that an EXTRAORDINARY MEETING of the Proprietors of the Association will be held at the same place on the said 1st day of May next, immediately after the Half-Yearly Ordinary General Meeting, when the following RESOLUTIONS will be SUBMITTED for consideration and approval:—

1. "That in pursuance of the Statutory Power of the Association in this behalf the nominal Capital of the Association be increased from £3,800,000 to £4,940,000 by appropriating for this purpose £1,140,000 from the sum or sums applied from time to time out of Revenue to the extension and improvement of the Works of the Association, and to other purposes to which Capital was properly applicable."
2. "That the increased Capital of £1,140,000 be issued in the form of Capital Stock, ranking *pari passu* with that already issued, and be allotted to the present proprietors, free of cost, in proportion to their holdings, at the rate of £3 for every £10 now registered in their names, and that this increase do take effect on the re-opening of the Register of Transfers of Capital Stock on the 2nd inst."
3. "That the Capital Stock be transferable on and after the said 2nd day of May next in multiples of One Pound, instead of multiples of Ten Pounds as at present."

By order of the Board,
ROBT. W. WILSON,
Secretary.

Offices, 21, Austin Friars,
London, E.C., April 9, 1906.

Re GRAHAM, MORTON, LIMITED, IN LIQUIDATION.

FOR SALE, as a running concern, the Engineering Business carried on by the above Company. The Works were built about Two Years ago, and are situated in the Engineering District of the City of Leeds. They cover an area of upwards of 4½ Acres. The area covered by the bays of the works is 7000 square yards. There is a Railway Siding connected with the Great Northern Railway running direct into the Works. There are Two Belliss and Morcom Engines and Dynamos of 150-horse power each. There is also a Set of large Hydraulic Pumps and Accumulators. The Hydraulic pressure is 200 pounds per square inch. There is a separate Dynamo Engine for lighting the Offices, and also sufficient Boiler power for driving the above Engines. Electric current is generated throughout the Works. There are Four 10-ton Cranes and One 6-Ton Crane working inside the Works, and One 10-ton Crane working on the Gantry outside.

For further Particulars and Orders to view, apply to the Liquidator, Mr. ROBERT HILDITCH, (Armitage and Norton, Chartered Accountants), at the Works, Pepper Road, Hunslet, LEEDS.

PINNER GAS COMPANY, LIMITED.

SALE BY TENDER OF 600 "B" SHARES OF £5 EACH.

MINIMUM PRICE, £6 15s. PER £5 SHARE.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER 600 "B" Shares of £5 each; being a portion of the Additional Capital authorized by the Pinner Gas Order, 1901.

The Shares will be allotted to the highest bidders; but no Tender will be accepted at a lower price than £6 15s. per £5 Share.

The Standard rate of dividend authorized for these Shares was 7 per cent. per annum, which was the rate paid last year; but the sliding-scale is now applicable, and the price of Gas has been reduced, and is about to be further reduced, and it is quite expected that a greater dividend will be paid for the current year, and a further increased dividend next year.

No Tender will be received after Twelve o'clock noon on Saturday, the 14th day of April, 1906.

Particulars and Forms of Tender can be obtained on application to the Secretary.

By order,
WM. WMS. BOX,
Secretary.

28, Great James Street, Bedford Row,
London, W.C.,
March 16, 1906.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

NOW READY, THE SECOND EDITION OF

GAS COMPANIES'

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A Practical Treatise on the Keeping of Gas Companies' Accounts.

By JOHN HENRY BREARLEY, and BENJAMIN TAYLOR.

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Highest Results in Gas, & Excellent Coke.

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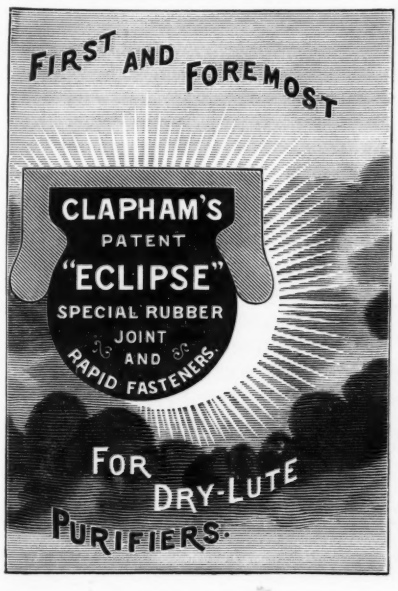

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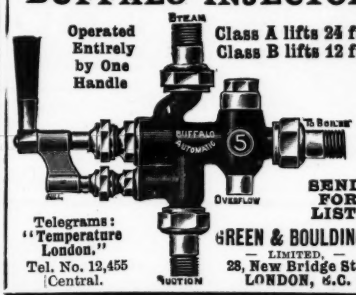

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Rich in Illuminating Power and yield of Gas Above the Average in Weight and Quality of Coke.

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for determining the calorific value of gases

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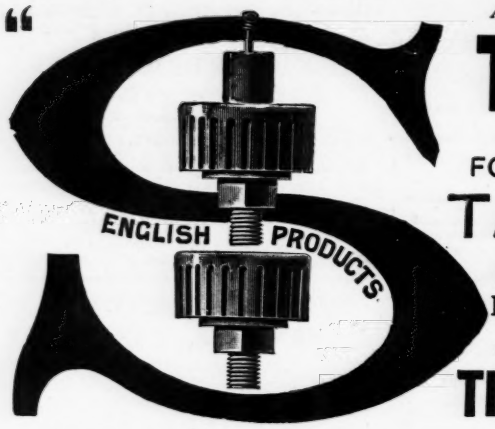

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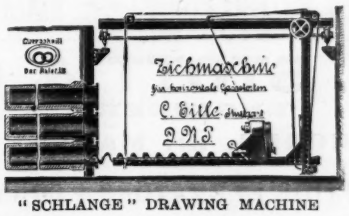

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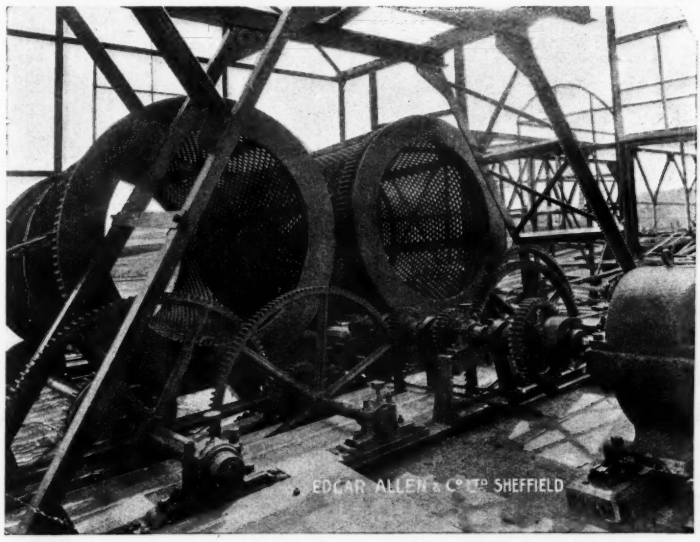

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Gas Bags for repairing Mains Round Shape. All Seams Stitched and Taped.

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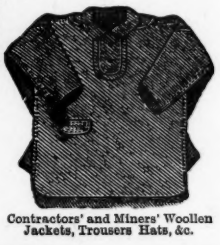
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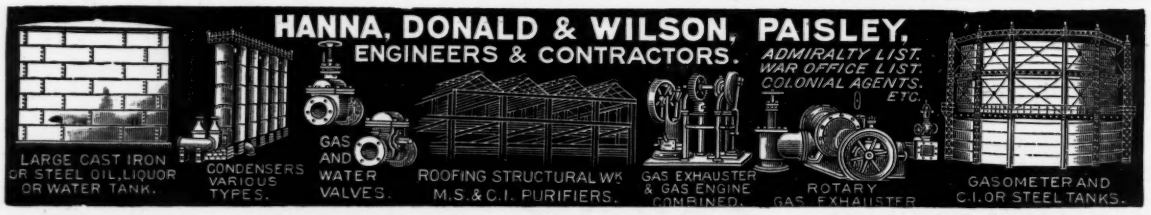
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Fig. 35. 100 c.p.

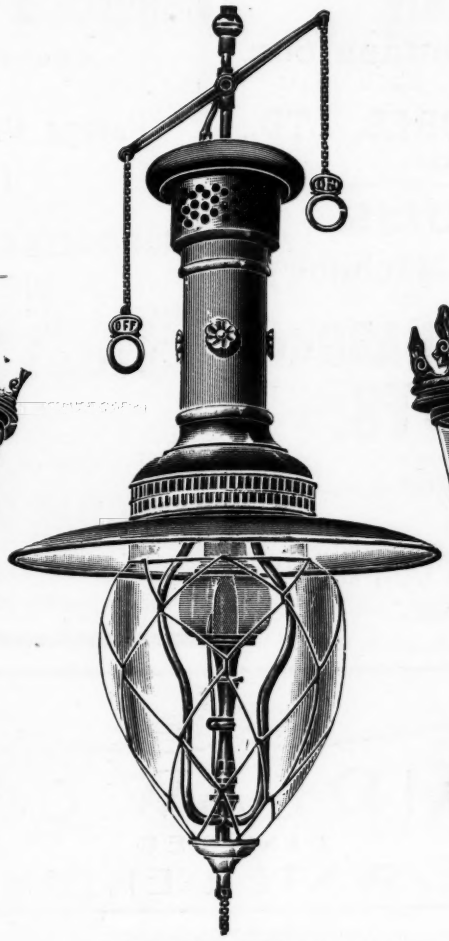

Fig. 607. 600 c.p.
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Fig. 35a. 300 c.p.
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Illustrated Advertisement, with full Particulars, in "JOURNAL" for April 4, 1905, p. 66.

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[See Illustrated Advertisement, April 3, p. 74.]

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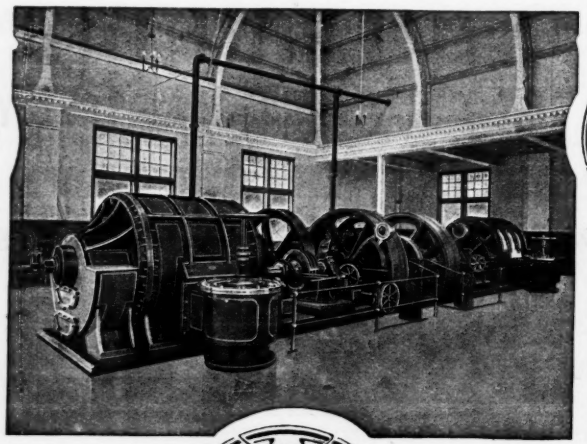

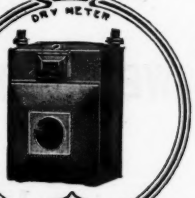

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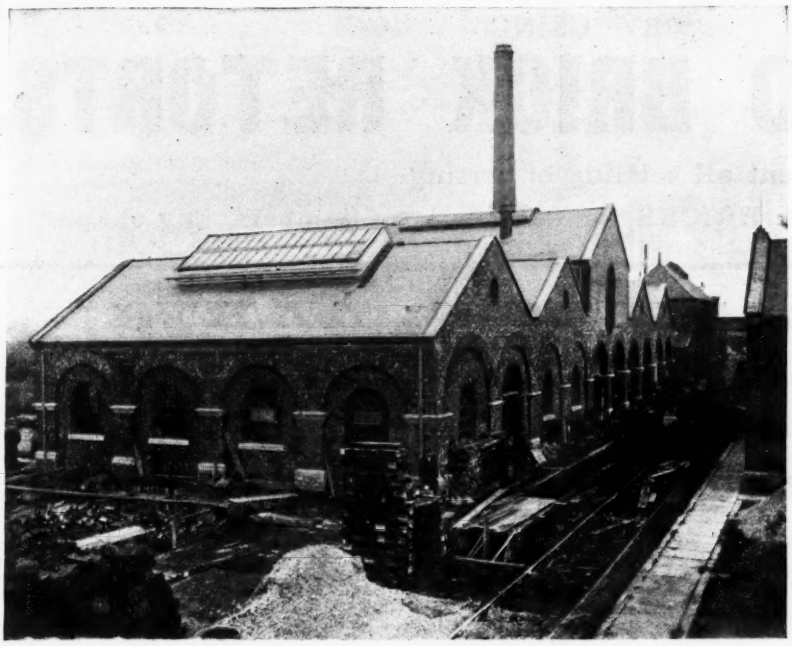

Photo. showing Methane-Hydrogen Plant under construction at the Great Western Railway Gas-Works, Swindon.

NO OIL REQUIRED.

The Methane-Hydrogen Apparatus uses **TAR** instead.

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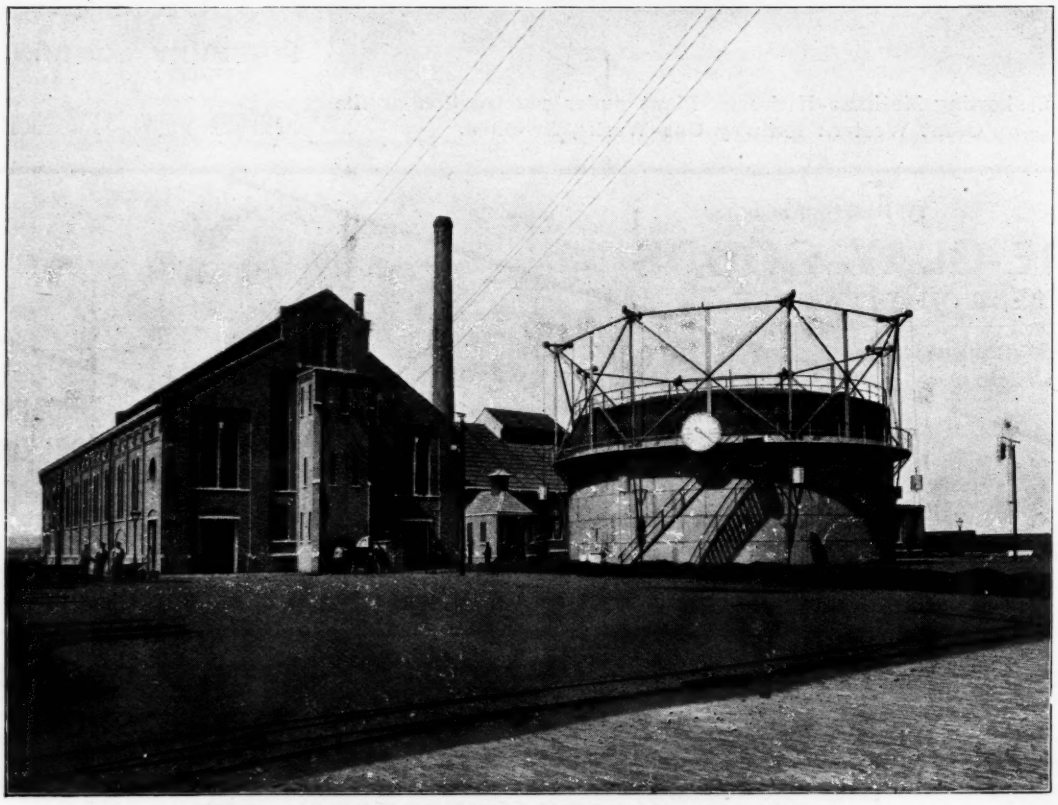

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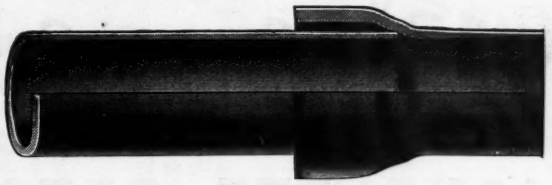

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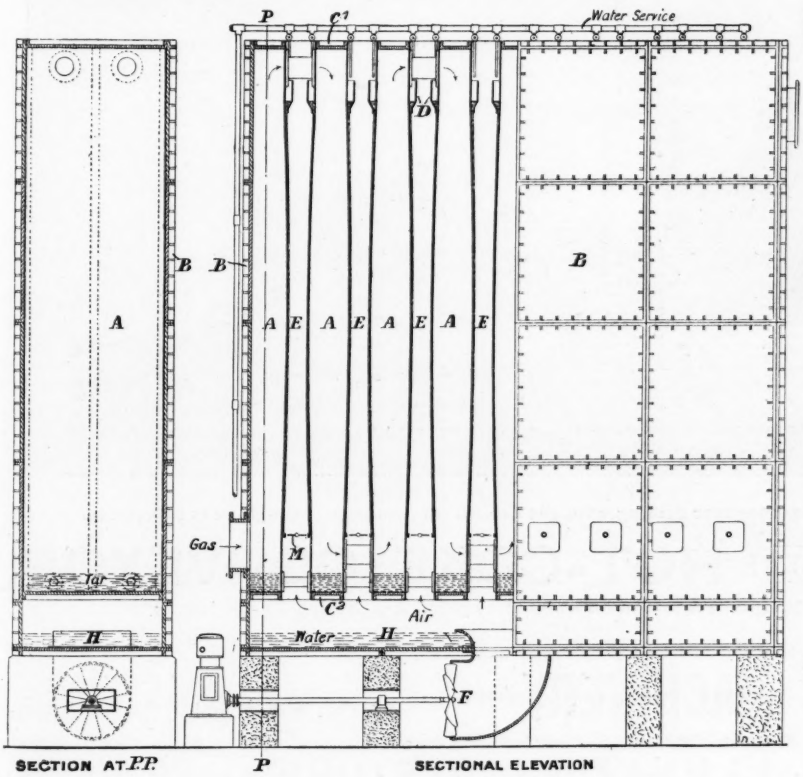

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EITHER ON
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Photograph showing West's Coke-Conveyor dealing with the Coke from Nineteen Through Beds of Retorts.

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